American Journal of Diseases of Children

VOLUME 45 MARCH, 1933 NUMBER 3

CONGENITAL SYPHILIS

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In spite of the vast amount of study and research already directed toward its various puzzling problems, congenital syphilis remains baffling in its behavior. Many phases of the infection are still obscure. Its vagaries are difficult of explanation.

The wealth of material available at Grady Hospital, Emory University division, a general hospital for the treatment of Negroes in Atlanta, seemed to offer an unusual opportunity for investigation. During the past six years, in collaboration with Dr. J. R. McCord of the department of obstetrics, certain routine data have been collected on all infants in the new-born service, and subsequently these infants have been followed in the outpatient department. When one considers the persistency of the infection over periods of many years, even to subsequent generations, the duration of this study seems indeed short, and nothing final can be claimed for the findings. Therefore, it is offered as a preliminary study only, with the hope that much valuable information may be obtained as these patients are followed through their childhood and adolescence and even to adult life.

In this study no distinction is made between the infection which takes place in utero via the placenta and the maternal and fetal blood streams, the so-called heredosyphilis, and that which occurs during passage of the fetus through the birth canal.

Neither time nor space is permitted in this report for reference to the many excellent investigations carried out by various workers on this subject. The works of Ross and Wright, Cooke and Jeans, Fordyce and Rosen, McCord, Stokes and many others are familiar to the student of congenital syphilis and require no repetition. Suffice it to say that, in the main, the studies reported here are in confirmation of the results of these observers, adding weight to their conclusions and, in a few instances, bringing out more clearly certain points of behavior of the infection.

A group of 903 Negro infants born in the obstetric ward at Grady Hospital forms the basis for this work. These infants were either syphilitic or born of mothers known to harbor the infection. The study

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Read before the Section on Pediatrics at the Eighty-Third Annual Session of the American Medical Association, New Orleans, May 13, 1932.

has been directed toward the determination of: (1) the probable fate of these infants, (2) the age of appearance, frequency and significance of certain physical findings encountered in the syphilitic infant and young child and, finally, (3) an evaluation of prenatal therapy.

The following routine was attempted in the outpatient department. Mothers were instructed to bring their babies to the clinic at the ages of 1 month, 2 months, 4 months, 6 months and 1 year, and twice a year thereafter. A physical examination and Wassermann test were made at each visit unless the child had already developed positive evidence of the disease. The inability to impress on these mothers the great importance of periodic examination, added to their dread of a blood test, made it impossible to accomplish the entire program except in rare instances. However, sufficient material was obtained to give some illuminating data.

In the Wassermann test as performed for the past two years, the

TABLE 1.—*A Statistical Study of Congenital Syphilis Based on a Series of 903 Negro Infants*

		Syphilitic	Doubtful	Nonsyphilitic
Infants born of syphilitic mothers:				
Group I	103	103	0	0
Group II	140	140	0	0
Group IV	324	0	0	324
Group V	254	0	0	254
Group VI	29	0	0	29
Total	850	243	0	607
Infants having positive Wassermann reactions of cord born of mothers whose Wassermann reactions are negative:				
Group III	53	30	23	?
Grand total	903	273	23	607

Kolmer antigen has been used. Prior to that time the saturated cholesterolized antigen was in use.

Table 1 presents a summary of the entire series, showing the various groups into which the patients arrange themselves by virtue of the Wassermann reaction or physical findings. Eight hundred and fifty of these infants, found in groups I, II, IV, V and VI, were born of syphilitic mothers, the diagnosis of syphilis being made on the Wassermann reaction, which in practically every case was checked. Groups I and II comprise those infants who were proved syphilitic either at birth or subsequently, and include 243 of the 850 cases, or 28.5 per cent. Groups IV and V are composed of infants who were born free from the infection and who have remained so for varying periods of time. In group VI are 29 infants with a positive Wassermann reaction of the cord but with negative reactions of the blood on all subsequent tests and with no evidence of the disease on repeated physical examinations. The last 3 groups, then, contain 607 infants who have thus far escaped the infection—a percentage of 71.5 of the infants born of syphilitic mothers.

Finally, in group III are placed 53 infants who had positive Wassermann reactions of the cord but whose mothers' Wassermann reactions have been consistently negative. Thirty of the patients are definitely syphilitic and 23 are doubtful, probably nonsyphilitic.

A more detailed analysis of each group is given in the following tables.

Two such statistical studies were made of group I; table 2 gives the age at which these infants first showed definite evidence of the disease, physically and serologically. Sixty-four, or more than 50 per cent, were proved to be syphilitic by the beginning of the fourth month; 81 showed evidence of the disease by the seventh month, and the remaining 22 were

TABLE 2 (Group I).—*Infants Having a Negative Wassermann Reaction of the Cord Later Becoming Definitely Syphilitic, Showing Age at Which Positive Wassermann Was First Noted; Mothers in This Group Proved Syphilitic* *

Age, Months	Number	Positive Physical Findings at Birth	Positive Physical Findings Subsequently	Number of Infants with Previous Negative Wassermann Giving Age in Months
1	14	5	13	0
2	27	1	25	4 (1 mo.; 1¼ mo.; 1 mo.; 1¼ mo.)
3	23	4	23	7 (all under 2 months)
4	7	1	6	2 (1½ mon.; 2¾ mo.)
5	6	0	6	1 (2 months)
6	4	0	4	4 (all under 2 months)
7–12	13	1	11	6 (1 at 7¼ months; 5 under 2 months)
13–24	5	0	5	1 (2½ months)
25–36	2	0	0	1 (7 months)
37–48	2	0	1	1 (3½ months)
Total	103	12	94	27 (under 4 months—two exceptions)

* Conclusion: It is probable that an infant born of a syphilitic mother, reaching the fourth month of life without physical or serologic evidence of the disease, will escape the infection. There are two apparent exceptions to this statement, namely, the infant in whom a positive reaction was found at 11 months and the one in whom a positive reaction was found at 28 months.

first noted to be syphilitic at ages varying from 7 months to 4 years. In the last column are given the number of negative Wassermann reactions obtained on these patients before the reaction of the blood finally became positive and the age at which these tests were made. It will be seen that in only two instances were negative Wassermann reactions obtained after the fourth month; one was found at 7¼ months in an infant who did not give a positive reaction of the blood until he reached the age of 11 months, and the other, at 7 months in an infant who gave a positive reaction at 28 months. Neither of these children showed any evidence of the disease on physical examination at any time; unfortunately, antisyphiltic therapy was instituted before the tests of the blood were repeated. These observations seem to justify the conclusion that it is probable that an infant born of a syphilitic mother, reaching the

fourth month of life without physical or serologic evidence of the disease, will escape the infection. This table also shows how closely the physical findings of the infants checked with the Wassermann reaction of the blood; 12 infants showed evidence of the disease at birth, while 94 presented positive physical findings later in life. Only 2 infants in this group gave no clinical signs of syphilis in spite of repeated positive blood tests.

The second statistical study of group I (table 3) compares the patients whose mothers received prenatal therapy with those whose mothers received no treatment. Thirty-eight mothers of this group received antisyphilitic therapy; only 7 of them were given more than 8 injections of neoarsphenamine. The Wassermann reaction during labor was negative in 15 instances, showing that the therapy had been

TABLE 3 (Group I).—*Infants Having a Negative Wassermann Reaction of the Cord Later Becoming Definitely Syphilitic, Showing Prenatal Therapy and Mother's Wassermann Reaction*

Prenatal Therapy Number of Injections of Neoarsphenamine	Number	Mother's Wassermann				Parity			Positive Physical Findings in Infants	
		Prenatal		Labor						
		Positive	Negative	Positive	Negative	1	2	3 or More	At Birth	Subsequently
4 or less	18	18	0	12	3	6	3	8	1	17
5 to 9	13	13	0	3	8	5	2	6	2	12
9 or more	7	7	0	3	4	2	3	2	2	6
Total prenatal therapy	38	38	0	18	15	13	8	16	5	35
No prenatal therapy	65	30	3	49	4	19	16	28	7	59
Grand total	103	68	3	67	19	32	24	44	12	94

sufficient in these cases to reverse the Wassermann reaction but not sufficient to prevent transmission of the disease. Of the 65 mothers who received no therapy, 30 gave a positive reaction during pregnancy and 49 a positive reaction at the time of labor. Four gave a negative Wassermann reaction during labor.

In group II are placed infants who had a positive reaction of the cord and who, for the most part, have shown definite clinical evidence of the disease or repeatedly positive tests of the blood. There are 140 patients in this group; the mothers of all were known to be syphilitic. The table compares the reactions of the patients receiving antisyphilitic therapy with those receiving none. Forty-three mothers of this group were given treatment; only 3 of them received more than 8 injections of neoarsphenamine. During labor the Wassermann reaction of those mothers who received therapy was positive in 27 instances and negative in 10, as compared to 77 positive and 4 negative reactions in the 97 who did not receive therapy. It is interesting to

note that the percentage of negative Wassermann reactions during labor among the treated mothers of group I is almost 50 per cent, whereas in group II it is only 27 per cent. One wonders whether this fact possibly has some bearing on the delayed appearance of infection in the infant. Another point of interest in this group is the fact that 19 infants failed to show any physical evidence of the disease, owing probably to the immediate institution of antisyphilitic therapy on the

TABLE 4 (Group II).—*Syphilitic Infants Born of Syphilitic Mothers Having a Positive Wassermann Reaction of the Cord, Showing Prenatal Therapy and Positive Physical Findings in Infant* *

Prenatal Therapy Number of Injections of Neoarsphenamine	Number	Mother's Wassermann: Prenatal Positive	Mother's Wassermann: Prenatal Negative	Mother's Wassermann: Labor Positive	Mother's Wassermann: Labor Negative	Parity: 1	Parity: 2	Parity: 3 or More	Positive Physical Findings in Infants: At Birth	Positive Physical Findings in Infants: Subsequently
4 or less	24	24	0	17	3	12	5	5	9	17
5 to 9	16	16	0	9	6	5	3	8	6	11
9 or more	3	3	0	1	1	1	1	1	0	1
Total prenatal therapy	43	43	0	27	10	18	9	14	15	29
No prenatal therapy	97	34	1	77	4	36	19	32	37	63
Grand total	140	77	1	104	14	54	28	46	52	92

* Of treated cases, 9 failed to show any physical evidence of syphilis. Of untreated cases, 10 failed to show any physical evidence of syphilis.

TABLE 5 (Group III).—*Infants Having Positive Wassermann Reactions Born of Mothers Whose Wassermann Reactions Are Negative*

Infants	Number	Wassermann: Birth Positive	Wassermann: Birth Negative	Wassermann: Later Positive	Wassermann: Later Negative	Physical Findings: Birth Positive	Physical Findings: Birth Negative	Physical Findings: Later Positive	Physical Findings: Later Negative	No. of Mothers with Repeatedly Negative Wassermann Reactions	No. of Mothers with Syphilitic Histories
Definitely syphilitic	30	22	5	22	1	10	20	30	0	11	4
Probably nonsyphilitic	23	23	0	0	15	0	23	0	23	13	6
Total	53	45	5	22	16	10	43	30	23	24	10

strength of a positive Wassermann reaction of the cord alone. It is possible that a certain number of these patients might never have shown positive physical findings and indeed the Wassermann tests might have become negative, even though no treatment was instituted. Such persons, of course, are not syphilitic and would have been placed in group IV.

Group III is composed of 53 infants having a positive Wassermann reaction either at birth, subsequently or on both tests. The mothers in this group have consistently shown negative reactions of the blood. The chart representing this group shows the observations in 30 patients who have proved to be syphilitic and compares them with those in 23

infants who, although they had positive Wassermann reactions of the cord have never shown any physical evidence of the disease and who, in 15 instances, have given negative Wassermann reactions on subsequent occasions. The number of mothers who have had more than a single negative Wassermann reaction was 24. In an effort to establish the diagnosis of syphilis in the mothers of this group a careful history was obtained in every case when it was possible. Ten gave information that was suggestive of syphilis. Since it has been shown that a syphilitic mother may transmit the disease to her offspring during a quiescent stage of the infection when the Wassermann reaction is negative, it seems reasonable to suppose that these mothers are syphilitic, and that this fact may be proved in the future.

TABLE 6 (Group IV).—*Nonsyphilitic Infants Born of Syphilitic Mothers, Showing Prenatal Therapy and Mother's Wassermann Reaction* *

Prenatal Therapy Number of Injections of Neoarsphenamine	Number	Mother's Wassermann: Prenatal: Positive	Mother's Wassermann: Prenatal: Negative	Mother's Wassermann: Labor: Positive	Mother's Wassermann: Labor: Negative	Parity: 1	Parity: 2	Parity: 3 or More
4 or less	71	71	0	26	33	31	17	19
5 to 9	61	61	0	24	32	19	15	20
9 or more	109	109	0	34	67	43	27	31
Total prenatal therapy	241	241	0	84	132	93	59	70
No prenatal therapy	83	36	6	62	9	24	14	35
Grand total	324	277	6	146	141	117	73	105

* These children were observed for periods of from four months to six years.

A study of the Wassermann reactions of all syphilitic infants in this series, namely group I, with 103 infants, group II with 140, and group III with 30, making a total of 273, shows that 103, or 37 per cent, of these infants were born with a negative Wassermann reaction, a figure which coincides exactly with that given by Cooke and Jeans. It is safe, then, to assume that syphilitic infants fail to show evidence of the disease at birth in 37 per cent of the cases.

In groups IV and V are placed 578 infants who, although born of syphilitic mothers, have given negative reactions of the blood and have shown no physical findings throughout the course of this study. Since it has been shown in the study of group I that a certain number of infants with negative Wassermann reaction of the cord, born of syphilitic mothers, will later show evidence of the disease (most probably by the fourth month), the nonsyphilitic infants of this series have been divided into groups: group IV, those who have been observed for periods varying from four months to six years, and group V, those who have been observed for three months or less. The tables con-

sidering these groups compare the observations on the infants born of mothers having had prenatal therapy with those made on infants whose mothers received no treatment. It brings out again the effect of antisyphilitic therapy on the Wassermann reaction of the mother during labor. It is interesting to note that 83 mothers of group IV and 63 mothers of group V received no antisyphilitic therapy and yet produced infants apparently free from the infection. The Wassermann reaction during labor was positive in 146 instances in group IV and in 109 instances in group V, a total of 255. The Wassermann reaction during labor was negative in 245 persons in both groups, this reversal naturally being produced by prenatal therapy.

TABLE 7 (Group V).—*Infants Having Negative Wassermann Reactions Born of Syphilitic Mothers, Showing Prenatal Therapy and Mother's Wassermann Reaction* *

Prenatal Therapy Number of Injections of Neoarsphenamine	Number	Mother's Wassermann: Prenatal Positive	Mother's Wassermann: Prenatal Negative	Mother's Wassermann: Labor Positive	Mother's Wassermann: Labor Negative	Parity: 1	Parity: 2	Parity: 3 or More
4 or less	60	60	0	20	26	23	9	19
5 to 9	68	68	0	22	32	23	11	33
9 or more	63	63	0	16	41	32	18	16
Total prenatal therapy	191	191	0	58	99	78	38	68
No prenatal therapy	63	30	1	51	5	15	11	26
Grand total	254	221	1	109	104	93	49	94

* These children were observed for three months or less. Since some of these infants have been followed for less than three months, a certain number, approximately 15 per cent, will ultimately show evidence of the disease.

In the last column in this table is shown the parity in this group. The number of pregnancies seems to have little influence on the outcome of the product of conception.

By studying all infants born with a negative Wassermann reaction of the cord and determining the number who have subsequently shown evidence of the disease, it may be possible roughly to estimate in group V the number of infants who probably will become syphilitic. A total of 681 were born with a negative Wassermann reaction of the cord—the combined figure for groups I, IV and V. Of this number, 103, or those included in group I (approximately 15 per cent of the whole number) have become syphilitic. It is probable, therefore, that about 38 of the 254 infants in group V will ultimately show evidence of syphilis.

In group VI are placed 29 infants having a positive Wassermann reaction of the cord and born of syphilitic mothers. These infants, however, never showed evidence of the disease, and all subsequent tests

of the blood were negative. It is reasonable to suppose that the infants are all nonsyphilitic, in spite of Wassermann reaction of the cord. The table representing this group compares the findings for patients whose mothers received prenatal therapy with those whose mothers received no therapy. It shows the mother's Wassermann reaction and the Wassermann reaction of the cord. It is important to note that 5 of these mothers gave a negative Wassermann reaction during labor. The occurrence of a positive reaction at birth in a nonsyphilitic infant has been noted by several observers. It has been explained on the theory of transmission of complement-fixation power of the mother's blood to that of the infant, from which it soon disappears. The fact that 5 mothers of this group gave a negative reaction during labor seems to make this theory inadequate in explaining the phenomenon.

TABLE 8 (Group VI).—*Nonsyphilitic Infants Having a Positive Wassermann Reaction of the Cord Born of Syphilitic Mothers, Showing Prenatal Therapy and Wassermann Reactions* *

Prenatal Therapy Number of Injections of Neoarsphenamine	Number	Mother's Wassermann: Prenatal Positive	Mother's Wassermann: Prenatal Negative	Mother's Wassermann: Labor Positive	Mother's Wassermann: Labor Negative	Parity: 1	Parity: 2	Parity: 3 or More	Cord Wassermann: Weakly Positive	Cord Wassermann: Strongly Positive
4 or less	4	4	0	3	..	3	..	1	1	3
5 to 9	10	10	0	7	3	3	2	3	4	6
9 or more	6	6	0	4	1	3	..	2	3	3
Total prenatal therapy	20	20	0	14	4	9	2	6	8	12
No prenatal therapy	9	3	0	7	1	3	..	4	1	8
Grand total	29	23	0	21	5	12	2	10	9	20

* Five mothers in this group gave a negative Wassermann reaction during labor, in spite of which fact the infant's Wassermann reaction of the cord was positive.

Of considerable interest in this table are the Wassermann reactions of the cord. Twenty infants gave a strongly positive reaction, while only 9 gave a weakly positive one. Most observers have found that this transitory Wassermann reaction of the nonsyphilitic infant born of a syphilitic mother is weakly positive. These figures seem to stress the point that an infant born of a syphilitic mother and having either a weak or a strong positive Wassermann reaction of the cord, is not necessarily syphilitic. Antisyphilitic therapy should not be instituted unless such infants are proved to be definitely syphilitic either by subsequent positive tests of the blood or by positive physical findings.

Tables 9 and 10 have been prepared to show the effect of prenatal antisyphilitic therapy on the mother's and the infant's Wassermann tests and physical findings. The patients have been divided into 3 groups: those receiving 4 or less injections of neoarsphenamine, those receiving from 5 to 9 injections and those receiving 9 or more injections.

All patients, of course, received mercury in some form, chiefly inunctions, in addition to arsenic. The last three columns in each table bring out in striking manner the efficacy of adequate prenatal therapy. One hundred and seventy-seven mothers received 4 or less injections of neoarsphenamine and produced 42 syphilitic infants, a therapeutic failure of 23.7 per cent; 168 mothers received from 5 to 9 injections and produced 29 syphilitic infants, a therapeutic failure of 17.2 per cent, while the 188 mothers who received 9 or more injections produced

TABLE 9.—*The Value of Prenatal Therapy in 533 Syphilitic Mothers, Showing Effect on Mother's Wassermann Reaction*

Prenatal Therapy* Number of Injections of Neoarsphenamine	Number	Mother's Wassermann Reaction: Prenatal Positive	Mother's Wassermann Reaction: Prenatal Negative	Mother's Wassermann Reaction: Labor Positive	Mother's Wassermann Reaction: Labor Negative	Number Non-syphilitic Infants	Number Syphilitic Infants	Percentage Therapeutic Failure
4 or less	177	177	0	78	65	135	42	23.7
5 to 9	168	168	0	65	81	139	29	17.2
9 or more	188	188	0	58	114	178	10	5.3
Total	533	533	0	201	260	452	81	17.8

* Prenatal therapy also included mercurial inunctions.

TABLE 10.—*The Value of Prenatal Therapy in 533 Syphilitic Mothers, Showing Effect on Infant's Wassermann Reaction and Physical Findings*

Prenatal Therapy* Number of Injections of Neoarsphenamine	Number	Infant's Wassermann Reaction: Birth Positive	Infant's Wassermann Reaction: Birth Negative	Infant's Wassermann Reaction: Subsequently Positive	Infant's Wassermann Reaction: Subsequently Negative	Positive Physical Findings in Infant: Birth	Positive Physical Findings in Infant: Subsequently	Number Non-syphilitic Infants	Number Syphilitic Infants	Percentage Therapeutic Failure
4 or less	177	28	149	42	135	10	34	135	42	23.7
5 to 9	168	26	142	29	139	8	23	139	29	17.2
9 or more	188	9	179	10	178	2	7	178	10	5.3
Total	533	63	470	81	452	20	64	452	81	17.8

* Prenatal therapy also included mercurial inunctions.

only 10 syphilitic infants, a therapeutic failure of 5.3 per cent. Of the entire group of 533 mothers receiving treatment, 81 gave birth to syphilitic infants, a failure in 17.8 per cent of the cases.

The number of positive Wassermann reactions during labor varies indirectly with the amount of prenatal therapy, as does the number of syphilitic offspring. However, these measures of the efficiency of treatment do not vary in the same proportion; for example, among the mothers receiving 4 or less injections of neoarsphenamine the Wassermann reaction during labor was positive in 54 per cent of the cases, while 23.7 per cent of the infants were syphilitic; among the mothers receiving 9 or more injections, 33 per cent of the Wasser-

mann reactions during labor were positive, while only 5.3 per cent of the infants were syphilitic.

Table 11 is a statistical study of 317 infants born of syphilitic mothers who received no prenatal therapy. Of this number, 155 or 48.8 per cent, have thus far shown no evidence of syphilis. This figure is surprisingly high; however, it must be remembered that approximately 15 per cent of the 63 infants in group V will ultimately become

TABLE 11.—*The Fate of 317 Infants Born of Syphilitic Mothers Who Received No Therapy, Showing Mother's and Infant's Wassermann Reactions and Physical Findings*

		Mother's Wassermann Reaction				Infant's Wassermann Reaction				Positive Physical Findings in Infant				
		Prenatal		Later		Birth		Subsequently						
Group	Number	Positive	Negative	Positive	Negative	Positive	Negative	Positive	Negative	Birth	Subsequently	Number Non-syphilitic	Number Syphilitic	Percentage Escaping Infection
I	65	30	3	49	4	..	65	65	..	7	59	..	65	..
II	97	34	1	77	4	97	..	75	..	37	63	..	97	..
IV	83	36	6	62	9	..	83	..	83	..	..	83	..	..
V	63	30	1	51	5	..	63	..	63	..	..	63	..	..
VI	9	3	0	7	1	9	..	..	9	..	..	9	..	..
Total	317	133	11	246	23	106	211	140	155	44	122	155	162	48.8

TABLE 12.—*The Physical Findings of Congenital Syphilis with the Dates of Their Appearance in 237 Infants*

Age	Enlarged Spleen	Skin Conditions	Rhinitis	Bone Changes	Lymph Adenopathy	Enlarged Liver	Anemia	Hemorrhage	Edema	Deaths	Total
Birth	34	26	12	19	10	10	2	5	5	38	63
4 weeks	19	17	10	4	9	5	5	4	4	8	31
8 weeks	31	25	33	38	21	8	7	1	1	4	68
3 months	18	6	11	14	7	2	3	2	2	3	32
4 months	8	4	9	5	7	2	3	..	..	2	12
5 months	4	1	2	2	4	1	1	..	..	1	6
6 months	4	..	2	..	3	..	..	..	..	..	4
7-12 months	11	7	6	..	13	1	3	..	..	2	17
24 months	1	3	2	..	1	..	..	..	..	..	3
36 months	1	..	..	..	1	1	1	..	..	..	1
Total	131	89	87	82	76	30	25	12	12	58	237

syphilitic and, furthermore, if the 30 syphilitic infants in group III were included in this study, the percentage of infants escaping the infection would be about 40, more nearly the expected figure. It should be emphasized that this figure applies to living infants born of mothers with a positive serum. According to McCord, the percentage of disastrous endings of pregnancies in serum-positive women receiving no therapy is much higher, running from 60 to 80 per cent.

Table 12 shows the usual physical findings of congenital syphilis with the age at which they appeared in 237 infants. They are arranged

in the table from left to right according to the frequency of their occurrence. Enlargement of the spleen was found in 131 infants, which is in excess of any other clinical evidence of the disease. However, the value of splenic enlargement in the diagnosis of syphilis is impaired by the fact that it may frequently arise from other causes in the infant and young child. For example, in the 903 patients of this series the spleen was found enlarged in 186 instances. Only 131 of these children were syphilitic, the remaining 55 being apparently free

TABLE 13.—*Physical Findings of Congenital Syphilis Infrequently Encountered, Showing Age at Which They Appeared*

	Number	Age at Which First Noted
Saddlenose	6	(1) 6 weeks; (1) 8 weeks; (1) 2½ months; (1) 3 months; (1) 6 months; (1) 8 months
Condylomata	4	(1) 8 weeks; (1) 3 months; (1) 4 months; (1) 8 months
Fissured lips	5	(1) at birth; (1) 4 weeks; (2) 6 weeks; (1) 11 weeks
Mucous patches	3	(2) at birth; (1) 8 weeks
Dactylitis	2	(1) 8 weeks; (1) 11 weeks
Syphilitic meningitis	3	(1) 9 weeks; (1) 3 months; (1) 4 months
Convulsions, probably syphilitic in origin	2	(1) 4 weeks; (1) 8 weeks
Orchitis	2	(1) 3 months; (1) 4 months
Keratitis	1	(1) at birth
Suggestive changes in the teeth:		
(a) notched incisors	2	(1) 7 months; (1) 3 years
(b) pegged canines	1	(1) 3 years

TABLE 14.—*Syphilitic Infants, Showing the Percentage of Infants with Negative Wassermann Reactions of the Cord*

		Wassermann Reaction at Birth		Subsequent Wassermann Reactions	
		Positive	Negative	Positive	Negative
Group I	103	0	103	103	0
Group II	140	140	0	140	0
Group III	30	30	0	30	0
Total	273	170	103 or 37%	273	0

from the infection. One of the most interesting and dependable physical findings was the change in the long bone. This occurred in 82 infants of the series, and was accompanied by a positive Wassermann reaction in every instance except one. This child was given antisyphilitic therapy before the Wassermann test could be repeated. One of the striking features of osteochondritis or periostitis in the syphilitic infant is the fact that its occurrence is limited to a very definite period in the baby's life. No case was observed after the fifth month, and practically all were noted in the second and third months, with the exception of those seen at birth. In the latter cases there was no clinical evidence of the

disorder, but a diagnosis was made exclusively by roentgenograms, whereas in those found later a clinical diagnosis was made and subsequently confirmed by the Wassermann test and roentgenograms.

In the last column on the right in table 12 are given the number of infants in each age group showing clinical evidence of syphilis. Sixty-three infants were born with some evidence of the disease; of this number, 38 died. Of the 237 syphilitic infants, 194 showed signs of the disease by the third month of life.

In table 13 are listed certain physical findings infrequently encountered. The number of cases showing each sign and the age at which it was first noted is given. It is of interest that 2 children, aged 7 months and 3 years, respectively, showed in their deciduous teeth findings which in the permanent teeth are considered highly suggestive of the disease. The Wassermann test corroborated these findings.

TABLE 15.—*Infants with Negative Wassermann Reactions of the Cord Born of Syphilitic Mothers, Showing the Percentage of Infants Finally Becoming Syphilitic*

		Wassermann Reaction at Birth		Subsequent Wassermann Reactions	
		Positive	Negative	Positive	Negative
Group I	103	0	103	103	0
Group IV	324	0	324	0	324
Group V	254	0	254	0	254
Total	681	0	681	103 or 15%	578 or 85%

SUMMARY AND CONCLUSIONS

1. A study of congenital syphilis in 903 Negro infants is reported. They have been observed for periods varying from a few weeks to six years.

Eight hundred and fifty of these patients were born of syphilitic mothers; 53 had positive Wassermann reactions, although all tests of the blood on the mothers had been negative.

2. Two hundred and forty-three of the babies born of syphilitic mothers were syphilitic; 607 were nonsyphilitic at the time this work was completed.

3. In a total of 273 syphilitic infants studied, 103, or 37 per cent, had negative Wassermann reactions of the cord. It is probable that an infant born of a syphilitic mother and reaching the fourth month of life without physical or serologic evidence of the disease will escape infection.

4. Six hundred and eighty-one patients were born with negative Wassermann reaction of the cord; 103, or 15 per cent, of this number subse-

quently became syphilitic. A negative Wassermann reaction of the cord does not eliminate the possibility of a syphilitic infection in the infant.

5. Of the 607 nonsyphilitic infants born of syphilitic mothers, 29, or 4.7 per cent, gave a positive Wassermann reaction of the cord. A positive Wassermann reaction of the cord without physical evidence of the disease does not establish the diagnosis of syphilis. These infants should not receive antisyphilitic therapy unless the diagnosis is confirmed by means of subsequent tests of the blood or definite physical evidence of the infection. They must be watched with great diligence.

6. Five hundred and thirty-three mothers received antisyphilitic therapy of varying intensity; 81 of them, 17.8 per cent, produced syphilitic infants; 188 received 9 or more injections of neoarsphenamine and produced only 10, or 5.3 per cent, syphilitic offspring.

7. Three hundred and seventeen syphilitic women received no therapy, and produced 155 infants, 48.8 per cent, who are thus far free from syphilis. This figure will probably ultimately be reduced to about 40 per cent, as certain infants in the nonsyphilitic group become syphilitic, and further by the establishment of the diagnosis of syphilis in the mothers of 30 definitely syphilitic infants.

8. The positive physical findings in 237 syphilitic infants are shown, the age at which they were noted and the frequency of their appearance being given.

ABSTRACT OF DISCUSSION

Dr. Hugh McCulloch, St. Louis: The work done by Drs. Jeans and Cook on a mixed group agrees substantially with the observations of Dr. Roberts. They found, however, that the incidence of syphilis seems to increase in the lower social strata of life. There are three periods of life when syphilis can be recognized in children. The figures presented by Dr. Roberts clearly show that the important time for diagnosis is prenatal life. This is particularly important from the standpoint of therapy because it is there that the most satisfactory results can be obtained in these children. When the mother receives adequate early treatment, her child is almost surely protected. The second period for diagnosis is during early infancy, and at this time the diagnosis rests on the clinical observation of these infants, irrespective of the Wassermann reaction. Dr. Roberts has observed in this group the symptoms that have been known for a long time, each as enlargement of the spleen, skin manifestations, rhinitis, and bone changes. This group of symptoms is separate from those seen in the third period in older children, among whom one finds particularly enlargement of the liver, changes in the bone, interstitial keratitis, deafness, caries in the teeth, and mental changes. The study of Dr. Roberts reemphasizes the need for treatment of the mother during her pregnancy as offering the most satisfactory solution for the care of these infants. I should like to ask Dr. Roberts whether he made a spinal fluid examination in the two children of group 2 with late syphilis after their Wassermann test had been negative?

Dr. Joseph Yampolsky, Atlanta, Ga.: I want to call your attention to the fact that in our clinic in the last few years my associates and I have noticed an

increase of bone infection in young children. Dr. Roberts has shown in his study that 82 of the 400 children had bone changes. It is possible that routine examination at birth for bone changes in syphilitic children would reveal a surprising number even before the Wassermann test became positive. It is also true that in the last few years we have found many more cases of pseudoparalysis than we have in the past. I wonder if it would be advisable or possible to take roentgenograms of the fetus and whether the bone changes at that time would not substantiate the fact that many syphilitic children are found with a negative Wassermann reaction, which later becomes positive.

Dr. M. Hines Roberts, Atlanta, Ga.: In reply to Dr. McCulloch's question regarding spinal fluid examination, routine spinal fluid examination was not made on these infants who were found negative in group 2. Dr. Yampolsky's observation about the frequency of bone changes, I think, is interesting. Certainly I think that roentgen examination of these infants at birth would probably show some bone changes that do not show up clinically. In fact, that was true in nineteen cases in the series of eighty-two.

USE OF PLACENTAL EXTRACT IN PREVENTION AND MODIFICATION OF MEASLES

CHARLES F. McKHANN, M.D.
AND
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Studies of the age incidence of the communicable diseases have served to point out the high resistance of the new-born infant to certain diseases and a lack of resistance at this age to other diseases. Measles, scarlet fever, diphtheria and poliomyelitis occur infrequently in infants, and to these the new-born infant appears to be immune. No immunity is observed to smallpox, chickenpox, whooping cough or pyogenic infections. This selective immunity of the new-born infant to communicable diseases is of the passive type and presumably is derived from the mother by means of the placental or mammary transmission of antibodies.

The presence in blood obtained from the umbilical cord of antibodies to diphtheria,[1] scarlet fever [2] and poliomyelitis [3] has been demonstrated. The immunity of the new-born infant to measles, if the mother has experienced the disease, has been pointed out by Herrmann,[4] and by

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1. Fischl and Wunscheim: Ueber Schutzkörper im Blute des Neugeborenen, Ztschr. f. Heilk. **16**:249, 1895. Polano, O.: Der Antitoxin Uebergang von Mutter auf das Kind, Ein Beitrag zur Physiologie der Placenta, Ztschr. f. Geburtsh. u. Gynäk. **53**:456, 1904. von Gröer, F., and Kassowitz, K.: Studien über die normale Diphtherieimmunität des Menschen: I. Ueber die Natur des normalen menschlichen Diphtherieschutz-Körper (speziell beim Neugeborenen), Ztschr. f. Immunitätsforsch. u. exper. Therap. **22**:405, 1914; II. Ueber das Verhalten des normalen Diphtherieantitoxins bei Mutter und Neugeborenen, ibid. **23**:108, 1914. Kuttner, A., and Ratner, B.: The Importance of Colostrum to the New-Born Infant, Am. J. Dis. Child. **25**:413 (June) 1923.

2. Toomey, J. A., and August, M. H.: Studies in Scarlet Fever: Blanching with Placental Serum, Am. J. Dis. Child. **38**:953 (Nov.) 1929. Paunz, J., and Csoma, E.: Entsteht die Scharlachimmunität der Neugeborenen auf Plazentarem Wege oder durch die Laktation? Jahrb. f. Kinderh. **126**:181, 1930.

3. Aycock, W. L., and Kramer, S. D.: Immunity to Poliomyelitis in Mothers and Newborn as Shown by Neutralization Test, J. Exper. Med. **52**:457, 1930.

4. Herrmann, Charles: The Relative Immunity of Infants Under Five Months of Age to Infection with Measles, Arch. Pediat. **40**:678, 1923; The Relation of Heredity to the Diseases of Infancy and Childhood, ibid. **41**:301, 1924.

Debré and Joannon.[5] Observations on the presence of measles immune bodies in the blood from the umbilical cord have been published by Finkelstein.[6] Recently, Jorge [7] and de Souza [8] have used placental blood for immunization against measles.

The established facts regarding the presence of antibodies in blood from the umbilical cord suggested that a study of protein extracts of human placentas might yield additional information as to the mechanism of the immunity observed in the new-born infant, and furthermore that extracts might be developed which could be administered to patients, and which might be capable of rendering children temporarily less susceptible to certain diseases, especially measles and poliomyelitis. In a previous paper the details of the preparation and testing of a placental protein extract have been given.[9] It was found that protein material extracted from human placentas contained substances which would (1) neutralize diphtheria toxin, (2) blanch scarlet fever rashes, (3) neutralize poliomyelitis virus and (4) prevent measles in exposed, susceptible persons.

The purpose of this communication is to present the results obtained in the prevention and modification of measles by means of the intramuscular injection of placental protein extracts. The extracts represent a concentrated preparation of the globulins of the fetal and maternal blood contained in the placenta together with some placental tissue protein. While the titer of immune bodies in the umbilical cord blood presumably approaches the titer of the antibodies in maternal blood, the titer of the extracts, because of the concentration of the globulin fractions, should be somewhat higher. The protection of patients against measles by means of placental extract might, therefore, be expected to be accomplished with a dosage of the extract smaller than the amount of adult blood serum required for protection, and perhaps in a dosage no larger than that of fresh convalescent serum.

PREPARATION OF PLACENTAL EXTRACTS

Normal placentas were collected in lots in sterile containers, incised repeatedly with a sterile knife and extracted in the refrigerator with 2 per cent solution of sodium chloride. The extracted material was decanted and centrifugated to free

5. Debré, R., and Joannon, P.: Immunité et sensibilité du nouveau-né vis-à-vis de la rougeole, Bull. méd., Paris **28**:31, 1925.

6. Finkelstein, G. S.: Puerperal Serum in the Prophylaxis of Measles, Vrach. delo **14**:791, 1931; abstr., J. A. M. A. **98**:92 (Jan. 2) 1932.

7. Jorge, R.: Sur la séro-prevention de la rougeole au moyen du sang placentaire, Bull. Office internat. d'hyg. pub. **24**:978, 1932.

8. de Souza, J. S.: L'immunization contre la rougeole par le sang du placenta, Arch. de méd. d. enf. **35**:633, 1932.

9. McKhann, C. F., and Chu, Fu Tang: Antibodies in Placental Extracts, J. Infect. Dis., March-April, 1933.

it of blood cells and tissue débris. Concentration of the globulin fraction was effected by precipitation in an ammonium sulphate solution 50 per cent saturated by volume. The precipitate obtained was collected on hardened filter paper, redissolved in physiologic solution of sodium chloride and dialyzed in cellophane bags, until the dialyzate was free from sulphates. After dialysis the solutions of the extract were removed from the cellophane bags, centrifugated and bottled. Mercurophen and merthiolate were used for sterilization and preservation of the material.[10] Multiple tests for sterility were made on each lot of extract.

Preliminary tests on animals showed the mercury-preserved material to be nontoxic even in quite large doses. Guinea-pigs received up to 8 cc. subcutaneously without evidence of injury, and rabbits received, at intervals of three days, as many as four injections of 5 cc. each, both intramuscularly and intravenously, without reaction. Preliminary tests on mice and rabbits failed to demonstrate the presence of more than a trace of female sex hormones. Before the material was used in patients, intradermal and subcutaneous injections were given to members of the laboratory personnel. No local or general reactions followed these injections.

PLACENTAL EXTRACT IN PREVENTION AND MODIFICATION OF MEASLES

Placental extracts, prepared according to the method described, have been given as a prophylactic measure to forty-three children who had not experienced measles and who had come in contact with the disease.

Forty of the susceptible children, in the course of hospitalization for other causes, became more or less intimately exposed to measles and were given placental extract. Twenty other children in the hospital, likewise susceptible to the disease and exposed at the same times, received adult immune serum, convalescent serum or no serum. The remaining three children who received placental extract were exposed at home to a sister who had the disease. As the children in the hospital became exposed in small groups, a separate consideration of each group is desirable.

Group I.—Ten children, ranging in age from 18 months to 6 years, were intimately exposed for one day to a child suffering from measles. The contact with the patient suffering from measles was so intimate that transmission of the disease would seem to have been certain. Seven of the ten children received placental extract in dosages varying from 4 to 10 cc. before the fourth day after exposure, while the remaining three children received 30 cc. each of adult whole blood on the third day after exposure. In six of the seven children who received placental extract measles did not develop, while in one, on the seventeenth day after exposure, a mild, modified type of the disease developed. In the three

10. Malcolm, W. G.: The Efficiency of Certain Germicides in the Preservation of Biologic Products, J. Bact. **22**:403, 1931. Jameson, W. A., and Powell, H. M.: Merthiolate as a Preservative for Biological Products, Am. J. Hyg. **14**:218, 1931.

children who received adult blood, the modified form of the disease developed.

Group II.—Six children, from 3 to 10 years of age, became intimately exposed to measles. Each received an intramuscular injection of 5 cc. of placental extract, in four instances as late as the fifth day after exposure. Measles developed in none of these six children. However, in another child on the ward, similarly exposed, who was thought to have had measles and who, therefore, received no prophylactic treatment, typical severe measles developed, indicating the probable thorough exposure of some of the patients in this group.

Group III.—Two patients, 1 and 3 years of age, were exposed for three days to a patient in the catarrhal and early eruptive stages of measles. On the fourth day after exposure and again on the sixth day each of these children received an injection of 3 cc. of placental extract. Measles developed in neither child. In a third child, however, who did not receive placental extract or other prophylactic serum, typical severe measles developed.

Group IV.—The twelve children in this group were on one of the wards of the Convalescent Home of the Children's Hospital, where contact among the patients is intimate. Previous experience indicated that measles would sweep through the entire group of susceptible children unless the disease could be stamped out promptly. Six of these children, ranging in age from 2 to 9 years, received 5 cc. each of placental extract on the fourth day of exposure to measles; the remaining six children, of similar ages, received 4 cc. each of fresh convalescent serum. None of the twelve children contracted measles.

Group V.—Eleven children, ranging in age from 3 to 9 years, were exposed for two days to a child in the catarrhal stage of measles. Seven of the children received 6 cc. each of placental extract on the fifth day after the last exposure (seven days after the beginning of exposure). Five of these children did not contract measles; in two the modified form of the disease developed. The remaining four children received 30 cc. each of adult whole blood on the third day after the last exposure. Three did not contract measles; in one the modified disease developed.

Group VI.—Seven children, between 10 months and 2 years of age, came in contact with a child in the catarrhal stage of measles. Six of these seven children received 6 cc. each of placental extract intramuscularly on the third or fourth day after exposure; the remaining child, 20 months of age, was quite ill with tuberculosis and was given 10 cc. of placental extract. None of these seven children contracted measles.

Group VII.—Nine children, nonimmune to measles, ranging from 4 to 9 years in age, were exposed for three days to a patient in the

catarrhal and early eruptive stages of measles. Four of these children received 6 cc. each of placental extract on the fifth day after the first exposure. The remaining five children received 33 cc. each of adult whole blood on the fifth day after the first exposure. None of these children contracted measles.

The three children who were exposed to measles at home are of especial interest. Two of the children, aged 5 and 7 years, were intimately exposed to their sister who had measles. A modified form of the disease was desired in these children, so administration of placental extract was delayed until the eighth day after the beginning of the exposure. One child received 5 cc. of placental extract by intramuscular injection; the other received 6 cc. In both children mild, modified measles developed. The third child treated at home was also in intimate contact with a sister who had measles. The extract, in 6 cc. dosage, was given on the eighth day after the beginning of exposure in an effort to obtain the modified form of the disease. In this patient no measles developed despite the intimate contact with the sister who had the disease, and despite the delayed administration of the extract.

In no instance did the intramuscular administration of placental extract appear to be without effect in either prevention or modification of measles in nonimmune contacts, and in no instance was there a general or local reaction or evidence of local infection following the injection of placental extract. In these cases the effective dosage of extract was slightly more than the usual dosage of convalescent serum. Further studies on the protein content of the extract indicate that standardization of the preparation with development of uniform potency and dosage may be reasonably expected.

SUMMARY

The results in this series of cases indicate that placental protein extracts can be prepared which, given by intramuscular injection to susceptible patients, early in the period of incubation, result in protection against measles or in an attenuation of the disease. Further studies on standardization of the extracts and the investigation of methods of increasing the yield of the material are necessary before placental protein extracts can be advocated as a uniformly effective and available preparation for use in the prevention or modification of measles.

As these extracts contained substances which (1) neutralize diphtheria toxin, (2) blanch scarlet fever rashes and (3) neutralize poliomyelitis virus, the suggestion is offered that experience will show that placental extract may prove to be an effective prophylactic measure in diseases other than measles.

EFFECT OF MILK AND MODIFIED MILK ON GASTRIC CONTRACTIONS

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After a meal, contractions of the stomach occur either when the stomach contains very little food or when it is completely empty. These contractions are usually associated with the sensation of hunger (Carlson [1]). The contractions of the empty stomach may be influenced through the nervous system by impulses from the vagus and splanchnic nerves. Emotions such as fear, rage, anger or joy cause an inhibition of the contractions primarily through the stimulation of the splanchnics (Carlson [2]). The motility of the empty stomach also seems to be influenced chemically by means of the condition of the blood; i. e., the injection of blood from a starved dog into the veins of a normal animal is accompanied by the onset of gastric contractions (Carlson [3]). Therefore, foods that are quickly digested and readily absorbed from the gastro-intestinal tract should probably delay the oncoming of hunger contractions as compared with those that are slowly digested and absorbed.

The oncoming of hunger contractions after a meal may then be considered as an index to the time that the meal has left the stomach and therefore may be said to throw light indirectly on the digestibility of the food taken. However, one must always remember that the emotional state of the subject and in all probability the concentration of the end-products of digestion present in the blood influence the contractions, and account should always be taken of these two factors.

The work so far completed includes studies on the gastric contractions following the intake of different milk foods of four children, aged 7, 9, 10 and 14. Three of the children were suffering from congenital

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From the Department of Pediatrics, the University of Chicago.

Read before the Section on Pediatrics at the Eighty-Third Annual Session of the American Medical Association, New Orleans, May 12, 1932.

1. Carlson, A. J.: The Control of Hunger in Health and Disease, Chicago, University of Chicago Press, 1916, chap. 3.

2. Carlson (footnote 1, chap. 10).

3. Carlson (footnote 1, chap. 18).

dislocation of the hip and one from muscular dystrophy. The gastrointestinal tracts of these children were in every respect considered normal. The gastric contractions were recorded by the balloon method suggested by Boldyreff and perfected by Carlson. A bromoform manometer was used. The recording of the gastric contractions was initiated one hour after the ingestion of 200 cc. of the food to be tested and continued for two hours. The food was preferably taken in the morning in place of breakfast. Sometimes the noon meal was omitted, and the material to be tested was given in its place.

The subjects were all hospitalized for more than six months before the work on gastric motility was initiated. They were all thoroughly accustomed to the methods used in recording gastric contractions; they swallowed stomach tubes as a matter of course, and apparently no unpleasant emotional or physical sensations accompanied the performance.

In addition to the observation of the initiation of gastric motility, the emptying time of the stomach after ingestion of the various foods was checked by the removal of small samples of material every fifteen minutes until no more could be obtained. On these samples, gastric acidity as shown by titration and pepsin content as shown by Mett's method were observed to see whether the different foods had a varying effect on the secretion of gastric juice. The foods given previous to the recording of the gastric contractions included untreated cow's milk, milk to which a standard package of junket had been added, processed milk, i. e., carnation milk and Mead's whole powdered milk, and acid milk, i. e., lactic acid milk, protein milk and buttermilk. For purposes of comparison the gastric contractions following a meal of one slice of dry toast and a cup of tea were recorded.

RESULTS

The results may be briefly summarized.

High motility vigorous type 1 and type 2 contractions (Carlson [4]) usually occurred an hour and a half or less after the ingestion of the Ewald meal. The total acid was about 30; the free acid, about 20. It is interesting to note that Penzoldt [5] found that a 200 cc. portion of tea left the stomach at approximately one and one-half hours.

Low motility, practically an atonic stomach, was observed in all our trials after the feeding of milk. Previous work on gastric activity following the intake of untreated cow's milk shows variable results.

4. Carlson (footnote 1, p. 44).

5. Penzoldt: Deutsches Arch. f. klin. Med. **14**:535, 1893.

Siemsen [6] reported that the results obtained on studies of gastric motility were too inconsistent to make a definite statement. One of us (Schultz [7]) reported lowered gastric motility following the ingestion of milk. Our studies on gastric motility indicate that the emptying time of the stomach after a meal of milk is over three hours. (The fractional analyses, however, show that material can be withdrawn from the stomach for only an hour). These results are probably meaningless as it might be impossible to withdraw through the Rehfuss tube, the large curd formed in the stomach, and therefore the stomach may be full of solid casein while all the whey and gastric juice are withdrawn or passed through the pylorus. Tobler's studies on the emptying time of the stomach after a milk meal show that the time varies with the amount of fat present, the carbohydrate, the water and, to a slight extent, the volume.[8] He found fat and protein in the stomach for a longer period than the other constituents of milk. Tobler found that digestion of milk and the maximum secretion of acid reach their heights during the second hour.

Low motility or the complete absence of motility is usually observed following a meal of 200 cc. of milk treated with a standard package of junket. However, in three of our nine trials after the junket meal, type 2 contractions occurred at the end of the record, or about from two to two and a half hours after the feeding. Milk treated with junket is essentially milk to which the enzyme rennin has been added. This enzyme aids in the coagulation of milk. The coagulation of milk is of value as it enables a small amount of gastric juice to work on the coagulated casein, thereby initiating digestion before sufficient gastric juice is formed to reach all the particles (Tobler [9]). However, according to the experiments here recorded there is little difference in the digestibility of milk or milk to which junket has been added. Such difference as there is, however, indicates a speedier digestion of junket.

Milks that have been subjected to condensation, by means of evaporating off some or all of the water content, form smaller curds in the infant's stomach than does cow's milk. For this reason they are more easily digested and leave the stomach more quickly. The advantages of using those milks for infants have been reported in numerous clinical

6. Siemsen, W. J.: The Influence of Excessive Milk Feeding on Gastric Motility and Its Relation to Chronic Anorexia, Am. J. Dis. Child. **41**:291 (Feb.) 1931.

7. Schlutz, F. W.: The Problem of Chronic Anorexia in Childhood, J. A. M. A. **94**:73 (Jan. 11) 1930.

8. Tobler, L., and Bogen, H.: Ueber die Dauer die Magenverdauung der Milch und ihre Beeinflussung durch verschiedene Faktoren, Monatschr. f. Kinderh. **7**:12, 1908.

9. Tobler, L.: Ueber die Verdauung der Milch im Magen, Ergebn. d. inn. Med. u. Kinderh. **1**:495, 1908.

investigations (Leopold,[10] Springfield and Tobbey,[11] Marriott and Schoenthal,[12] and Brennemann [13]). Except in one instance, however, that of subjects fed carnation milk, i. e., milk condensed so that one part is formed from two parts of whole milk, experiments show no increase in gastric motility as compared with the motility observed after the ingestion of untreated milk.

With Mead's powdered milk, one subject showed a completely atonic stomach at one time and a slight motility a second time. Another subject showed considerable motility during one trial, and at a second trial motility appeared two and one-half hours after ingestion. A third subject showed a short hunger period one hour and fifteen minutes after ingestion of milk, and thereafter rest. This motility is considerably more than was observed when untreated milk was given.

High gastric activity in more than 50 per cent of the cases follows the ingestion of milks that are acidified, i. e., lactic acid milk, protein milk and buttermilk. This is a considerably higher motility than was observed with any of the previously mentioned milk products. Both the processed milks and the acid milk reduce the size of the curd; Brennemann [13] found each type of food equally advantageous in treating infants with digestive and nutritional disturbances. Our studies indicate that the increased acidity of the milk given is a factor in inducing hunger contractions after its ingestion. Marriott [14] carefully measured the p_H of the gastric contents of infants after the ingestion of various milk products. He found that in healthy breast-fed infants, the p_H was usually 3.5. After the feeding of cow's milk, the p_H increased to 5.7, owing to the high buffer value of cow's milk, which neutralized gastric acidity. The low acidity after the intake of cow's milk doubtless delayed peptic digestion and, possibly through its effect on the pylorus, the emptying time of the stomach. Marriott found that milk containing from 0.5 to 0.7 per cent of lactic acid does not neutralize the acid of gastric juice to any greater extent than breast milk. Consequently digestion could be assumed to go on at its normal rate of speed. This

10. Leopold, J. S.: Experiences with Whey Modified Milk in Infant Feeding, Am. J. Dis. Child. **8**:196 (Sept.) 1914; The Finkelstein Meyer Method of Infant Feeding by Casein Milk, Arch. Pediat. **27**:602, 1910.

11. Springfield, O. L., and Tobbey, J. A.: Advantages and Limitations of Condensed Milk in Infant Feeding, Arch. Pediat. **47**:769 (Dec.) 1930.

12. Marriott, W. McK., and Schoenthal, L.: An Experimental Study of the Use of Unsweetened Evaporated Milk for the Preparation of Infant Feeding Formulas, Arch. Pediat. **46**:135 (March) 1929.

13. Brennemann, Joseph: The Curd and the Buffer in Infant Feeding, J. A. M. A. **92**:364 (Feb. 2) 1929.

14. Marriott, W. McK., and Davidson, L. T.: The Acidity of the Gastric Contents of Infants, Am. J. Dis. Child. **26**:542 (Dec.) 1923.

variation in the p_H of the gastric contents may be the reason for the increased gastric motility which we observed after feeding acid milks.

Our measurements on the gastric acidity after different milks were fed show a lower total gastric acidity (approximately 20) with the use of untreated whole milk than with any other milk modification. With all other milk modifications, regardless of whether they were acidified or not, the total acidity varied between 40 and 60. This includes milk treated with junket. In all cases the pepsin content was about the same; the Mett tubes showed about 4 or 5 mm. of digestion at the end of the first hour after feeding. This was true for the gastric juice withdrawn after the feeding of cow's milk. This, then, indicates that in older children peptic digestion goes on as well with a lower gastric acidity as with a higher one. However, these findings do not check with the increased gastric motility found after the feeding of acid milk. Marriott's method of determining the p_H is, as he pointed out, a better measure of the useful gastric acidity than the ordinary methods of titration. Our studies merely indicate that further work on gastric motility correlated with the p_H of the gastric contents might show a relationship.

COMMENT

We realize that our findings on gastric motility after the ingestion of various foods are not conclusive. In order to make a complete study of gastric contractions following the intake of different foods, more patients should be studied, and each should be observed for a longer period of time. Since the central nervous system affects gastric contractions and even though the children studied were kept under the most uniform conditions possible, individual differences and slight variations occurring in the environment from day to day are bound to exert effects that can be made insignificant only through the study of many cases. Furthermore, the influence of the products of digestion present in the blood on the gastric contraction could not be completely ruled out, although the practice of giving the children their milk from eight to fourteen hours after the previous meal should have insured that there was at least no excess of the products at the time the records were taken.

So far as they have gone, these studies seem to indicate that gastric motility after the ingestion of whole cow's milk is very low but is improved and influenced favorably by certain modifications, particularly by its acidification.

ABSTRACT OF DISCUSSION

DR. L. R. DEBUYS, New Orleans: I think the observations that have been presented by Drs. Schlutz and Fetter are most interesting. The question of gastric motility and gastric function is one of interest to all of us, whether we are con-

cerned with the periods of infancy, childhood or later life. It is indeed worth while to encourage investigations to develop some method by which the various food elements and food combinations may be studied with as little abnormal influences as is possible entering into the problem.

Several years ago I was actively interested in the subject and investigated the influence of position on the emptying time of the infant's stomach, employing x-rays and barium. There are many factors that enter into the problem of gastric motility, such as the influences of the nervous system, i. e., fright, shock, etc.; the blood and its relation to nutrition or starvation; the muscular system, i. e., the musculature of the stomach; the digestive system; the respiratory system, because even the diaphragm seems to have a massaging effect and must be an interesting factor in the emptying of the stomach. Under certain conditions one has difficulty in breathing when the stomach is distended. Physical laws such as gravity, pressure, etc., must also have their influences.

Such studies must be carefully controlled and confirmed before being accepted. In their studies, Drs. Schlutz and Fetter have realized all of this and are to be commended for their work. It is to be hoped that they will continue in this fertile field of investigation.

DETERMINATION OF THE IRON CONTENT OF THE BLOOD IN CHILDREN

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There have been surprisingly few reports on the iron content of whole blood in infants and in children. Although a few articles have appeared dealing with iron in capillary blood, we have been unable to find reports of any work on the iron content of venous blood in children. The following study is based on determinations of the iron content of the venous blood of 135 children. Forty-eight of these were relatively normal and 87 had various pathologic conditions.

Van Vyve [1] in 1902 determined the amount of iron in the defibrinated cord blood of 116 new-born infants. In infants born at term the quantity varied around the mean figure of 45 mg. per hundred cubic centimeters. Tagliamuro [2] in 1907 found the iron content of the blood in 6 normal children aged from 7 months to 6 years to be between 33 and 48 mg. per hundred cubic centimeters. In 41 children with various pathologic conditions the figures fell within from 26 to 52 mg. In his series 0.5 cc. of blood was used, which was obtained by puncturing the finger. There was no constant relationship between hemoglobin and iron in health or disease. Brondi,[3] in 1908, using only 0.05 cc. of capillary blood, studied the iron content in 37 normal children from 2 months to 10 years of age. Twenty-four of these were 5 years old or more. The average iron content was 42 mg. per hundred cubic centimeters of blood. In 15 patients with anemia, from 22 months to 7 years of age, the blood iron ranged from 14 to 34 mg.

More recent work likewise reveals no figures for iron in venous blood, the determinations being made either on umbilical cord or on

From the A. Jacobi Division for Children, service of Dr. Jerome S. Leopold, and the Achelis Laboratory of the Lenox Hill Hospital.

1. Van Vyve, G.: Le fer dans le sang des nouveau-nés, Thèse, Paris, 1902, no. 415.

2. Tagliamuro, P.: Contributo clinico-sperimentale sul contento in ferro del sangue dei bambini in condizioni normali e pathologiche, Pediatria **15**:561, 1907.

3. Brondi, A.: Sul dosaggio del ferro. Ricerche cliniche sul ferro del sangue e del siero in bambini sani ed ammalati, Riv. di clin. pediat. **6**:579, 1908.

so-called capillary blood. Only one investigator, Halfer,[4] has given values for blood iron in children, the others confining their studies to new-born and older infants. In 25 healthy new-born infants, Gallo [5] obtained figures varying from 34 to 55 mg. per hundred cubic centimeters. The colorimetric method of Autenrieth and Koenigsberger was used. He could discover no direct relationship between the amount of hemoglobin, calculated by the Fleischl-Miescher method, and the blood iron. Nakayama and Inoue [6] reported that the iron content of the blood from the fetal side of the umbilical vein was 15 per cent higher than that of the blood obtained from the cubital vein of the mother.

Halfer's [4] study of the blood iron content of 126 children in health and in disease is the most extensive in the literature. He employed the Funk and Autenrieth colorimetric method, matching the "unknown" blood solution against a standard glass prism. The use of a glass prism is not as accurate as that of a standard iron solution, as the reagents added to the blood cannot, of course, be added to the prism. Traces of iron in the reagents cannot be balanced by this method. In addition, Halfer worked with only 0.025 cc. of blood which he obtained by puncture of the thumb. His series embraced 30 healthy infants and children from the first days of life to 8 years of age. All were said to have normal hemoglobin values and red blood cell counts, although no figures were given. Eighteen of these children were over 1 year of age. Of these, 9 had a blood iron content below 25 mg. per hundred cubic centimeters, and 12, under 30 mg. These are extremely low values for normal children. In 25 patients suffering from respiratory infections, the blood iron was below 25 mg. per hundred cubic centimeters in 17, although all were said to have a normal hemoglobin content. In 20 patients with various infections and normal hemoglobin values, the blood iron values were as low as 18.8. mg. per hundred cubic centimeters. In a group of 27 cases of various diseases, iron values of 17. 2, 19.6 and 20.8 mg. per hundred cubic centimeters of blood were found with normal hemoglobin. Halfer has given hemoglobin values for only 10 of the 126 children studied. If the hemoglobin contents of all the rest were normal, his blood iron values must be regarded as definitely too low. He observed no clear parallelism between the hemoglobin and the blood iron.

Kotikoff [7] studied 20 healthy infants from the time they were 2 weeks old until they had reached the age of 1 year. At frequent inter-

4. Halfer, G.: Blood Iron in Children in Normal and Pathological Conditions, Arch. de méd. d. enf. **33**:659, 1930.

5. Gallo, C.: Iron in Blood of the New-Born, Pediatria **32**:606, 1924; abstr., J. A. M. A. **82**:2089 (June 21) 1924.

6. Nakayama, S., and Inoue, S.: Iron in Maternal and Fetal Blood, Jap. J. Obst. & Gynec. **12**:273, 1929.

7. Kotikoff, I. A.: Blood Iron in Nurslings in Normal and Pathological Conditions, Jahrb. f. Kinderh. **132**:180, 1931.

vals determinations of the iron content were made by the Fowweather method on 0.5 cc. of blood taken from the heel. After falling rapidly from the high values of the new-born period, the average iron content of the blood varied between 40 and 45 mg. per hundred cubic centimeters. The lowest values were obtained at 9 months. Kotikoff observed an almost complete parallelism between blood iron and hemoglobin. No hemoglobin estimations, however, were made on his series of infants. A previous study of another group of healthy infants had yielded normal hemoglobin values for each month of the first year. Kotikoff compared these normal hemoglobin values with the average iron values for the corresponding months in his series. Since simultaneous determinations of hemoglobin and of iron were not made, the individual values for iron cannot be compared with any corresponding hemoglobin readings.

METHOD

Blood was taken between 8 and 9 o'clock in the morning before breakfast. One cubic centimeter of a 1.6 per cent solution of iron-free sodium oxalate procured from the United States Bureau of Standards was evaporated to dryness in a pyrex centrifuge tube, 2.5 by 4.5 cm. A tourniquet was applied to the arm so as to entail the minimal amount of stasis, and from 3 to 5 cc. of blood from one of the veins of the cubital region was allowed to flow through a rustless steel needle directly into the tube. The external jugular vein was used in only a few infants. Red blood cell counts and determinations of hemoglobin and iron were made on this blood. The red blood cell counts were made with standardized pipets and a standardized counting chamber. The Sahli and Newcomer methods were employed for the estimations of hemoglobin. Both instruments were checked by means of the Van Slyke oxygen-combining method. One hundred per cent Sahli was equivalent to 15.6 Gm. of hemoglobin per hundred cubic centimeters.

The procedure for the determination of iron in the blood reported in this paper is rapid and accurate. It has been used in this laboratory for the past year [8] and has given consistent results. It utilizes the digestion method of Wong,[9] the colorimetric procedure described by Stokes and Cain [10] and the extraction medium proposed by Bernhard and Drekter.[11]

Reagents.—Standard Solution A: Dissolve 0.702 Gm. of ferrous ammonium sulphate (Merck's reagent) in about 50 cc. of water, add 20 cc. of 10 per cent iron-free sulphuric acid, warm and add tenth-normal potassium permanganate solution

8. Reich, C., and Tiedemann, V.: A Study of "Iron Volume Index" of the Blood and Its Significance in the Treatment of Anemia, Am. J. M. Sc. **184**:637 (Nov.) 1932.

9. Wong, S. Y.: Colorimetric Determination of Iron and Hemoglobin in Blood, J. Biol. Chem. **55**:421, 1923.

10. Stokes, H. N., and Cain, J. R.: Determination of Iron as the Sulfocyanate, in Yoe, John H.: Photometric Chemical Analysis, New York, John Wiley & Sons, Inc., 1928, p. 218.

11. Bernhard, A., and Drekter, I. J.: A Note on the Determination of Iron in Blood and Biological Fluids, Science **75**:517 (May 13) 1932.

until a faint pink color persists. Dilute to 1,000 cc. One cubic centimeter of this solution will contain 0.1 mg. of iron.

Standard Solution B: Dilute standard solution A with an equal volume of water. One cubic centimeter of this solution will contain 0.05 mg. of iron.

Sulphocyanic Acid: Dissolve 100 Gm. of ammonium thiocyanate in 100 cc. of 65 per cent (by weight) sulphuric acid. Measure the volume, transfer to a large separatory funnel and shake the mixture with three fourths of its volume of amyl alcohol. Let the solution settle and discard the aqueous solution. Add an equal volume of water, and shake thoroughly. Preserve the water extract. Repeat the extraction of water, and combine the two extracts, which contain about 7 per cent of sulphocyanic acid. Saturate the water extract with solid mercuric sulphocyanate so that the excess remains on the bottom of the container. Allow to stand over night in a dark bottle.

Persulphate Solution: This is a saturated solution of potassium persulphate free from iron in distilled water.

Potassium Chlorate Solution: Dissolve 10 Gm. of chemically pure potassium chlorate (iron-free) in 100 cc. of water.

Extraction Mixture: Combine equal parts of ethylene glycol monobutyl ether and ethyl ether. The ether does not have to be of the highest purity, as the presence of mercuric sulphocyanate prevents the oxidation of sulphocyanic acid by peroxides which may be present in the ether.

Technic.—One cubic centimeter of oxalated blood is diluted with 4 cc. of iron-free distilled water. Using the same pipet with which the blood was measured, transfer 1 cc. of the diluted blood into a pyrex test tube (2.5 by 20 cm.). Add 1 cc. of concentrated sulphuric acid (free from iron), heat the tube until white fumes are given off, cover it with a small watch glass, and continue heating for two minutes. Remove the flame, place the tube at an angle of 45 degrees, and add 1 cc. of 10 per cent potassium chlorate carefully, drop by drop. Place the tube in an upright position and heat again until white fumes are evolved. Again place the tube at a 45 degree angle; add an additional 0.3 cc. of the potassium chlorate solution, and boil the mixture until all the chlorine is removed. Allow the tube to cool; dilute the contents with 15 cc. of water, and add a drop of persulphate solution. Add exactly 25 cc. of the extraction mixture, followed by 5 cc. of the sulphocyanic acid reagent. Fit the tube with a rubber stopper and shake thoroughly. The solution separates into two distinct layers, the upper of which is red and the lower colorless. The red color is compared in the colorimeter with a suitable standard solution of iron which has been digested and treated in the same manner as the unknown. Two standards are prepared as described under "Reagents."

Calculation: The following formulas are used in the colorimetric determinations:

$$S \times \frac{R_s}{R_x} \times 500 = \text{milligrams of iron per hundred cubic centimeters of blood}$$

S = strength of the standard
R_s = reading of the standard
R_x = reading of the unknown

The colorimetric method of Wong depends on the color produced by an aqueous solution of ferric sulphocyanate. This color fades rapidly owing to hydrolysis. The procedure of Stokes and Cain was found to be the most suitable, since the color produced by the ferric sulphocyanate is extracted by amyl alcohol and ether and does not fade rapidly. The possibility of the reduction of the ferric iron is eliminated by the use of potassium persulphate. The double salt of mercuric

sulphocyanate sulphocyanic acid prevents the oxidation of the sulphocyanic acid to yellow isopersulphocyanic acid, the latter interfering with the matching of the color. The only objectionable feature of this method, the amyl alcohol, has been eliminated by the use of the extraction medium of Bernhard and Drekter.

TABLE 1.—*Results in Group 1*

Case	Sex	Age in Years	Iron, Mg. per 100 Cc. of Blood	Hemoglobin (Newcomer), Gm. per 100 Cc. of Blood	Hemoglobin Calculated from the Blood Iron, Gm. per 100 Cc.	Hemoglobin (Sahli), per Cent	Red Blood Cells, Millions per C.Mm.	Iron Index
1	M	3	40.0	13.7	11.9	87	4.20	9.5
2	M	3	40.4	13.2	12.1	85	4.79	8.4
3	F	3	44.3	14.0	13.2	90	4.76	9.8
4	M	4	42.0	14.7	12.5	95	5.25	8.0
5	F	4	43.8	15.7	13.1	100	4.97	8.8
6	M	4	43.0	15.8	12.8	103	4.88	8.8
7	M	4	44.0	14.0	13.1	88	5.39	8.2
8	M	4	46.5	15.0	13.9	96	4.57	10.2
9	F	5	44.6	13.4	13.3	86	4.40	10.1
10	M	5	45.0	14.2	13.4	91	5.14	8.8
11	M	6	40.5	13.9	12.1	89	5.21	7.8
12	F	6	43.5	14.2	13.0	92	4.58	9.5
13	F	6	49.0	15.6	14.6	100	4.47	11.0
14	F	7	40.0	13.2	11.9	84	5.26	7.6
15	M	7	42.6	15.0	12.7	94	4.18	10.2
16	M	7	45.0	14.7	13.4	94	5.14	8.8
17	M	7	45.5	14.9	13.6	96	4.98	9.1
18	M	7	45.0	13.0	13.4	83	4.66	9.7
19	F	8	40.0	13.9	11.9	90	4.93	8.1
20	M	8	45.0	15.4	13.4	100	5.05	8.9
21	F	8	45.2	14.0	13.5	90	4.64	9.7
22	F	8	47.7	14.5	14.2	93	5.48	8.7
23	M	8	43.5	15.4	13.0	99	5.12	8.5
24	M	9	47.0	13.8	14.0	89	5.04	9.3
25	F	9	41.4	15.0	12.4	99	5.49	7.5
26	F	9	45.0	15.4	13.4	100	5.18	8.7
27	F	9	52.0	17.0	15.5	107	5.64	9.2
28	M	9	45.0	13.6	13.4	86	4.91	9.2
29	M	9	48.0	15.3	14.3	99	4.26	11.3
30	M	9	41.0	14.7	12.2	94	5.06	8.1
31	M	9	43.1	13.0	12.9	80	5.16	8.4
32	F	10	48.0	13.8	14.3	88	4.92	9.8
33	F	10	44.0	13.4	13.1	86	4.89	9.0
34	F	10	47.7	14.8	14.2	94	4.43	10.8
35	M	10	47.0	15.0	14.0	96	4.64	10.1
36	M	10	41.0	13.8	12.2	89	6.23	6.6
37	M	10	40.0	14.8	11.9	94	5.44	7.4
38	M	11	42.0	14.5	12.5	92	4.66	9.0
39	F	11	40.0	15.2	11.9	98	4.92	8.1
40	M	11	47.0	15.3	14.0	97	5.40	8.7
41	M	11	41.5	14.8	12.4	95	4.95	8.4
42	M	11	41.0	14.7	12.2	95	4.49	9.1
43	F	11	46.9	14.0	14.0	92	4.91	9.6
44	M	11	41.6	14.4	12.4	93	4.94	8.4
45	F	12	48.5	15.0	14.5	97	4.89	9.9
46	M	12	41.7	14.2	12.4	92	5.00	8.8
47	M	12	42.0	13.4	12.5	85	5.00	8.4
48	F	12	40.4	13.4	12.1	86	5.11	7.9
Averages.....			43.9	14.4	13.1	93	4.95	9.0

RESULTS

Group 1.—A group of 48 relatively normal children was studied. None were anemic or showed evidence of a derangement of iron metabolism. All were afebrile at the time the blood was taken. Some were in the surgical services with conditions that had been diagnosed as fracture, inguinal hernia and phimosis; others were recovering from infec-

tions, usually mild. The ages were from 3 to 12 years. The hemoglobin values (Newcomer) lay within a range of from 13 to 15.8 Gm. per hundred cubic centimeters, with one exception (subject 27, 17 Gm.). The average was 14.4 Gm. of hemoglobin per hundred cubic centimeters. The hemoglobin, determined by the Sahli method, varied between 80 and 107 per cent, with an average of 93 per cent. The average red blood cell count was 4,950,000 per cubic millimeter.

The blood iron concentrations for this group were between 40 and 52 mg. per hundred cubic centimeters. The average iron content was 43.9 mg. Table 1 shows the relationship between the hemoglobin values and the blood iron. Human hemoglobin is stated to contain 0.335 per cent of iron. To obtain the number of grams of hemoglobin corresponding to a given number of milligrams of iron, the latter is divided by 3.35. In all except one case, the hemoglobin value found by the Newcomer method differed from the hemoglobin value calculated from the blood iron content, these differences ranging from 0.1 to 3.3 Gm. per hundred cubic centimeters. In 20 cases the difference was 1.5 Gm. or more.

The relationship between hemoglobin and iron is shown graphically in chart 1. Using the factor 3.35, a line is plotted which enables one to read on the ordinate the number of grams of hemoglobin equivalent to a given number of milligrams of iron expressed on the abscissa. Theoretically, the value for the amount of pure hemoglobin corresponding to any figure for iron should always fall on some point on the line. The estimations of hemoglobin for the group of 48 relatively normal children are plotted against the blood iron values. The points do not approximate the line with any degree of regularity. It will be noted that 44 of the 48 points lie above the line. This indicates that in 44 of the 48 children the hemoglobin when calculated by the Newcomer method was higher than when it was calculated on the basis of the iron content.

The iron index of Murphy, Lynch and Howard[12] is obtained by dividing the number of milligrams of iron per hundred cubic centimeters of blood by the red blood cell count expressed in millions. In the present series the index averaged 9, fluctuating rather widely from 6.6 to 11.3.

Group 2.—A group of 87 children from 4 months to 17 years of age with various pathologic conditions was studied (table 2). There were 11 patients with definite anemia. Of these, 10 had a blood iron content below 35 mg. per hundred cubic centimeters, and 7 below 29 mg. In a group of 7 patients with congenital cardiac disease, 4 had a blood iron content of 50 mg. or more. One (subject 18), a cyanotic boy with

12. Murphy, W. P.; Lynch, R., and Howard, I. M.: Value of Determinations of Iron Content of Whole Blood, Arch. Int. Med. **47**:883 (June) 1931.

marked polycythemia, had the unusually high blood iron value of 74 mg. In 11 patients with rheumatic heart disease, the blood iron varied from 33 to 47.6 mg. There were 57 other children with various pathologic conditions, in whom the blood iron ranged from 31.2 to 50.2 mg.

In the entire group of 87 children no definite relationship existed between the nature of the disease and the blood iron.

A general relationship between the hemoglobin, as determined by the Newcomer and Sahli methods, and the blood iron content was observed. On examination of the correlation between the two, how-

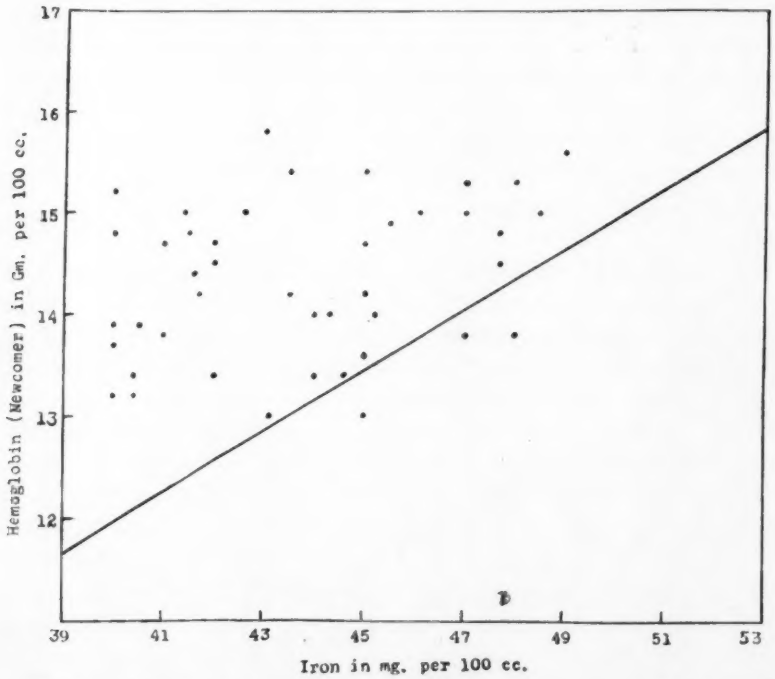

Chart 1.—The blood iron values plotted against the corresponding hemoglobin values in 48 relatively normal children. The line enables one to read on the ordinate the amount of pure hemoglobin which should yield any desired quantity of iron shown on the abscissa. Note the wide divergence of many of the points from the line. Forty-four of the 48 points lie above the line.

ever, it will be seen that the individual hemoglobin values obtained by these methods did not closely parallel the corresponding iron content of the blood. In all cases the hemoglobin values found by the Newcomer method differed from those calculated on the basis of the blood iron content, the differences ranging from 0.1 to 4 Gm. per hundred cubic centimeters. In 38 instances the Newcomer method gave values differing by 1.5 Gm. or more.

TABLE 2.—*Results in Group 2*

Case	Sex	Age in Years	Iron, Mg. per 100 Cc. of Blood	Hemoglobin (Newcomer), Gm. per 100 Cc. of Blood	Hemoglobin Calculated from the Blood Iron, Gm. per 100 Cc.	Hemoglobin (Sahli), per Cent	Red Blood Cells, Millions per C.Mm.	Diagnosis
					Anemias			
1	M	6	18.2	5.0	5.4	35	2.10	Chronic nephritis
2	F	14	22.7	7.4	6.8	47	2.85	Perinephritic abscess
3	F	¾	23.6	7.5	7.0	47	4.21	Bronchopneumonia
4	M	12	25.4	6.4	7.6	40	2.02	Acute myeloblastic leukemia
5	F	1	26.0	8.0	7.8	53	4.65	Bronchitis; anemia
6	F	1	28.5	10.8	8.5	70	4.87	Bronchopneumonia
7	M	4	28.6	9.4	8.5	61	3.95	Empyema
8	F	6	30.8	10.2	9.2	65	4.34	Mastoiditis
9	M	6	31.2	9.6	9.3	61	4.25	Acute nephritis
10	F	2	32.0	10.5	9.5	67	4.72	Tonsillitis
11	M	2	36.8	10.0	11.0	63	5.06	Lobar pneumonia
					Congenital Cardiac Disease			
12	F	13	40.0	12.0	11.9	78	5.21	
13	F	14	43.1	13.0	12.9	82	5.09	
14	F	11	46.0	15.9	13.7	102	4.91	
15	F	7	50.0	15.3	14.9	100	5.17	
16	M	9	50.0	18.0	14.9	120	6.29	
17	M	8	52.0	17.7	15.5	112	7.15	
18	M	17	74.0	21.8	22.1	140	8.65	
					Rheumatic Cardiac Disease			
19	F	5	33.0	12.2	9.9	79	3.68	Mitral stenosis and insufficiency; rheumatic fever
20	F	12	36.8	12.9	11.0	84	4.20	Mitral stenosis and insufficiency; influenza
21	F	10	36.8	12.5	11.0	80	4.06	Mitral stenosis and insufficiency
22	F	12	39.0	13.4	11.6	86	4.65	Mitral stenosis and insufficiency
23	F	12	40.0	11.4	11.9	72	4.24	Mitral stenosis and insufficiency, decompensated
24	F	7	40.7	14.7	12.2	94	4.59	Mitral stenosis and insufficiency
25	M	8	44.5	13.8	13.3	88	4.20	Mitral stenosis and insufficiency
26	F	10	45.0	15.7	13.4	100	4.52	Mitral stenosis and insufficiency; aortic insufficiency
27	M	11	46.0	14.0	13.7	89	5.24	Mitral stenosis and insufficiency
28	F	13	47.4	11.2	14.2	71	4.69	Mitral stenosis and insufficiency
29	F	10	47.6	12.8	14.2	82	4.79	Mitral insufficiency
					Miscellaneous			
30	M	⅓	36.8	11.1	11.0	71	4.25	Nasopharyngitis
31	M	1½	36.8	13.0	11.0	84	4.54	Acute bronchitis; tonsillitis
32	F	1½	39.0	14.8	11.6	98	4.59	Convulsions
33	M	1½	37.0	10.9	11.0	70	4.82	Rickets
34	M	2	50.2	16.0	15.0	105	4.30	Bronchopneumonia
35	F	2	38.4	12.4	11.5	79	4.91	Cervical lymphadenitis
36	F	3	32.6	11.0	9.7	71	3.87	Acute nephritis
37	F	3	38.5	12.9	11.5	83	4.36	Acute pharyngitis
38	F	3	32.3	12.3	9.6	78	4.48	Acute pharyngitis and rhinitis
39	F	4	38.0	11.5	11.3	74	5.10	Pneumonia
40	M	4	36.5	13.3	10.9	84	4.90	Chronic nephritis
41	M	4	35.6	12.4	10.6	80	4.71	Acute bronchitis

TABLE 2.—*Results in Group 2—Continued*

Case	Sex	Age in Years	Iron, Mg. per 100 Cc. of Blood	Hemoglobin (Newcomer), Gm. per 100 Cc. of Blood	Hemoglobin Calculated from the Blood Iron, Gm. per 100 Cc.	Hemoglobin (Sahli), per Cent	Red Blood Cells, Millions per C.Mm.	Diagnosis
				Miscellaneous—Continued				
42	F	4	38.4	12.8	11.5	83	3.58	Acute follicular tonsillitis
43	F	4	40.5	15.6	12.1	108	4.70	Acute pharyngitis
44	M	4	36.8	11.3	11.0	73	5.11	Acute tonsillitis and pharyngitis
45	F	4	45.0	15.0	13.4	97	4.09	Acute cervical lymphadenitis; chronic purulent otitis media
46	M	4½	40.7	12.6	12.1	81	4.69	Bronchitis; tonsillitis
47	M	5	40.0	13.2	11.9	83	5.18	Bronchopneumonia
48	F	5	45.0	13.0	13.4	84	4.22	Cervical adenitis
49	M	6	44.7	13.4	13.3	85	5.10	Tuberculous pleurisy with effusion
50	F	6	40.0	13.2	11.9	84	4.16	Catarrhal stomatitis
51	M	7	38.2	15.4	11.4	97	4.72	Convalescent pneumonia
52	F	7	38.0	13.8	11.3	87	4.57	Trichinosis
53	M	7	39.0	14.0	11.6	90	4.12	Catarrhal jaundice
54	F	7	31.2	12.3	9.3	79	4.03	Lobar pneumonia
55	M	7	50.0	15.6	14.9	102	5.50	Paratyphoid fever; dehydration
56	F	7	42.5	12.6	12.7	80	4.18	Acute pharyngitis
57	M	7	38.5	12.4	11.5	78	4.05	Rhinitis and pharyngitis
58	F	8	44.5	11.9	13.3	77	4.85	Chorea
59	F	8	33.0	11.4	9.9	73	4.12	Convalescent pneumonia
60	M	8	42.0	12.7	12.5	82	4.83	Laceration of finger
61	F	8	49.5	15.7	14.8	102	4.56	Frontal and maxillary sinusitis
62	F	8	37.8	14.0	11.3	91	5.58	Chronic tonsillitis
63	F	8	37.0	13.0	11.0	83	4.37	Acute cervical lymphadenitis; acute tonsillitis
64	M	8	36.8	12.7	11.0	81	4.75	Inguinal hernia
65	M	8	38.5	13.2	11.5	85	4.66	Abscess of the lung
66	M	8	43.0	14.0	12.8	91	4.47	Acute rheumatic fever
67	M	9	42.0	15.0	12.5	93	4.60	Convalescent pneumonia
68	F	9	39.2	12.4	11.7	81	4.60	Convalescent pneumonia (saccharated ferrous carbonate, 15 grains daily for ten days)
69	F	9	45.0	14.8	13.4	95	4.86	Trichinosis
70	F	9	39.0	15.2	11.6	84	4.97	Catarrhal jaundice
71	F	9	37.7	12.3	11.3	79	4.36	Bronchopneumonia
72	M	9	34.2	12.4	10.2	80	4.25	Acute arthritis
73	M	9	38.4	13.2	11.5	84	4.93	Acute pharyngitis
74	M	9	36.2	11.8	10.8	75	4.57	Undiagnosed condition of abdomen
75	F	9	45.0	15.6	13.4	100	5.20	Mastoiditis
76	M	10	40.0	12.7	11.9	82	4.40	Osteomyelitis
77	M	10	33.3	13.0	10.0	83	4.49	Diabetes mellitus
78	F	10	48.1	12.1	14.3	74	4.88	Chronic tonsillitis
79	M	10	33.4	11.0	10.0	71	4.11	Fracture of tibia
80	M	10	40.0	12.9	11.9	80	4.81	Fracture of radius
81	F	11	39.2	11.9	11.7	75	4.32	Acute pharyngitis and tonsillitis
82	M	11	41.0	14.0	12.2	90	5.53	Acute appendicitis
83	F	11	33.2	11.9	9.9	75	3.87	Chronic appendicitis
84	M	12	36.4	13.1	10.9	84	4.90	Cicatricial contracture of finger
85	M	12	35.0	13.2	10.4	85	4.78	Fracture of radius
86	F	13	41.8	12.9	12.5	83	5.12	Malnutrition
87	M	13	38.7	12.0	11.6	77	3.89	Hypertrophied tonsils and adenoids

The relationship between hemoglobin and iron in this group is shown in chart 2. The line plotted from the iron content of pure hemoglobin (0.335 per cent) again allows one to read on the ordinate the number of grams of hemoglobin which should yield any desired number of milligrams of iron recorded on the abscissa. The points, like those for group 1, did not approximate the line with any regularity. It will be

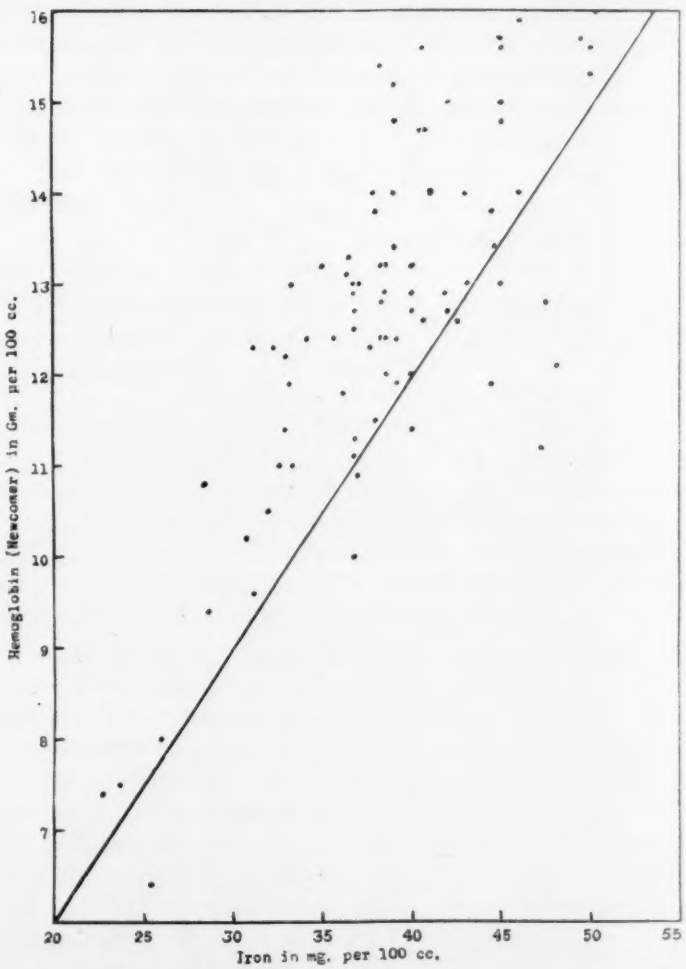

Chart 2.—The blood iron values plotted against the corresponding hemoglobin values in 87 children with various pathologic conditions. The line enables one to read on the ordinate the amount of pure hemoglobin which should yield any desired quantity of iron recorded on the abscissa. Many of the points show a wide divergence from the line. Seventy-five of the 87 points lie above the line. In order to conserve space 4 points representing hemoglobin values above 17 Gm. or below 6 Gm. per hundred cubic centimeters are not shown in the graph.

observed that 75 points lie above the line. This demonstrates that in 75 of 87 children the hemoglobin, determined by the Newcomer method, exceeded the values calculated from the iron content of the blood.

COMMENT

Exclusive of the work done over twenty years ago, Halfer's was the only report found on determinations of blood iron in children. The investigations were conducted on capillary blood. The amount of pressure which it is sometimes necessary to use in order to obtain enough blood from the skin for an accurate analysis for iron may result in a dilution of the sample with tissue juices. When blood is taken directly from a vein, this objection is, of course, removed. On the other hand, Smith [13] found the iron content of the blood taken from a vein severely congested by means of a tourniquet to be as much as 12 mg. per hundred cubic centimeters greater than that of blood removed from an uncongested vein in the same adult. In one case, however, in which the vein was slightly congested, the difference in the iron values was only 0.1 mg. per hundred cubic centimeters. In the present series a minimal amount of pressure was applied with the tourniquet.

Throughout this work a general relationship was observed between hemoglobin and iron. For instance, in 47 relatively normal children with blood iron values from 40 to 50 mg. per hundred cubic centimeters, the hemoglobin content was in every instance within a physiologic range of from 13 to 15.8 Gm. per hundred cubic centimeters. In both groups there were many cases that exhibited a good approximation between the observed and the calculated amounts of hemoglobin. On examining the data more carefully, however, it will be noted that the individual Newcomer and Sahli estimations of hemoglobin did not give figures that closely and constantly paralleled the corresponding blood iron figures. This can be demonstrated by comparing two cases at random. Such a comparison will frequently show that one child may have a lower iron content and at the same time a higher hemoglobin content than another. The absence of a close parallelism is further demonstrated in the cases of 11 children with a blood iron content of 45 mg. per hundred cubic centimeters and hemoglobin values ranging from 13 to 15.7 Gm. per hundred cubic centimeter. Forty-three per cent of the entire series of 135 patients had hemoglobin values (Newcomer) which differed by 1.5 Gm. or more per hundred cubic centimeters from those calculated on the basis of the blood iron content. In 88 per cent, the observed hemoglobin values exceeded the theoretical ones.

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13. Smith, F. H.: Effects of Congestion and Heat upon the Blood Iron, Biochem. J. **22**:739, 1928.

Certain factors may enter into an explanation of these discrepancies:

1. Hemoglobin is said to contain 0.335 per cent of iron. This factor may be inaccurate. Peters and Van Slyke [14] stated that the precise ascertainment of the iron content of purified human hemoglobin is a problem that awaits solution. A factor that is actually too high might help to explain the fact that in 88 per cent of the cases the observed amounts of hemoglobin exceeded those calculated from the blood iron content.

2. There may be some substance in the blood which gives a reaction for hemoglobin by the acid hematin methods and yet does not contain iron.

3. The discrepancies may either completely or in part lie within the limits of error of the methods used.

CONCLUSIONS

The iron content of the venous blood of 48 relatively normal children ranged from 40 to 52 mg. per hundred cubic centimeters. The average was 43.9 mg.

2. In 87 children with various pathologic conditions, the blood iron content ranged from 18.2 to 74 mg. per hundred cubic centimeters.

3. No constant relationship was found between the amount of hemoglobin, determined by the Sahli and Newcomer methods, and the blood iron concentration. In 88 per cent of 135 cases the amount of hemoglobin determined by the Newcomer method exceeded that calculated from the blood iron content.

14. Peters, J. P., and Van Slyke, D. D.: Quantitative Clinical Chemistry, Baltimore, Williams & Wilkins Company, 1931, vol. 1, p. 525.

INTESTINAL INFECTIONS IN INFANTS AND IN CHILDREN—1930 AND 1931 SERIES

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In the late summer and autumn, numbers of infants whose complaint is usually diagnosed clinically as "acute intestinal intoxication" are admitted to the Hospital for Sick Children, Toronto. The mortality among these sufferers is high. Divergent views held in various places concerning the etiology stimulated the commencement of an investigation into the cause or causes that produce the symptom complex thus designated. This intensive survey was begun in October, 1928, and has continued up to the present. The report of the first part of the survey has been published.

The failure to find bacteria of generally accepted pathogenicity in at least 42 of the 172 cases of the 1928-1929 series of cases indicated the necessity for further and more intensive investigation. The finding of agglutinins in the serum of a patient whose stool culture had yielded no important bacterial species was good evidence that the significant organism was being "missed" and suggested that the examination of a series of stool specimens from each patient might yield more positive results.

Accordingly, in the autumn of 1930, the stools of 67 infants, 53 of whom were admitted to the hospital with clinical symptoms diagnosed as acute intestinal intoxication, were examined. The majority of these infants were admitted in September, and 24 died. Out of 47 stools examined, 30 showed blood or pus or both, either macroscopically or microscopically. Mucus was observed in the stools of 9 of the remaining 20 patients, for whom no observations were recorded in regard to blood or pus. Blood and pus or either alone might have been present, though not observed, in other specimens from the same cases.

The relation of these findings to the clinical diagnoses and the bacteriologic observations are summarized in table 1. It will be seen that there is no essential difference in the stools in the various clinical diagnoses. It is apparent, too, that definitely pathogenic bacteria have been

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isolated from the majority of the stools under study, some of which showed blood and pus or either alone, and some did not. Dysentery or paratyphoid bacilli were isolated from 21 stools which manifested blood and pus or either alone, from 7 which showed neither blood nor pus and from 14 stools on which no report of this character was recorded; that is, 42, or 63 per cent, of the 67 cases investigated have yielded definitely pathogenic organisms, the majority of which were dysentery strains. Species of apparent etiologic significance were isolated unas-

TABLE 1.—*Relation of Stool Characteristics and Bacteriologic Observations to Clinical Diagnosis*

			Bacteriologic Observations							
Clinical Diagnosis	Stools Showing	Number	Sonne	Flexner	Schmitz	Asiaticus	Dispar (?)	Paratyphoid	Other Bacteria	Neg.
Acute intestinal intoxication	Blood and pus	9	1	5	5	0	0	1	1	1
	Blood alone...	9	4	2	1	0	0	0	3	0
	Pus alone.....	4	2	1	1	1	0	0	0	0
	Neither.....	15	1	1	5	0	2	0	5	2
	Not examined.	16	0	1	10	2	1	1	3	3
Subtotal.....		53	8	10	22	2	3	2	12	6
Infectious diarrhea.....	Blood and pus	1	..	..	1	..	..	..	..	..
Fermentative diarrhea.....	Blood alone...	2	1	..	..	..	..	..	..	1
	Not examined.	2	..	1	..	1	..	..	..	..
Subtotal.....		4	1	1	..	1	..	..	..	1
Dysentery.....	Blood alone...	1	..	..	..	..	..	..	..	1
Miscellaneous diagnoses.....	Blood and pus	2	1	..	..	1	..	..	..	..
	Blood alone...	1	..	..	..	..	..	1	..	..
	Pus alone.....	1	..	..	..	..	1	..	..	..
	Neither.....	2	..	..	1	..	..	..	1	..
	Not examined.	2	..	..	2	..	..	..	..	..
Subtotal.....		8	1	..	3	1	1	1	1	..
Totals.....		67	10	11	26	4	4	3	13	8

sociated with other recognized pathogens in some cases, and in others in association with other suggestive organisms. B. morgani was present in about 50 per cent and B. schmitzii in about 39 per cent of the stools.

Agglutination tests were carried out with the serums in 25 cases. Two serums gave positive results with their homologous Sonne strains, and 3 did not agglutinate the homologous Sonne strains. The serums in 3 cases in which no strains were isolated agglutinated the Sonne bacillus in dilutions of 1:320. Two serums which clumped the Sonne bacillus agglutinated a Flexner antigen in lower dilutions than they did the former antigen. The serums in 2 cases in which B. dysenteriae Flexner was isolated agglutinated the homologous culture in dilutions of 1:80 and 1:160. The stool culture in the latter case had also yielded B.

dysenteriae Sonne, for which no agglutinins could be demonstrated. No serum agglutinated B. paratyphosus B, B. dispar (?), B. asiaticus or B. schmitzii. As a result of the unsatisfactory serologic observations in these cases, as well as in the previous series, all available serums have been reexamined, and the details of this investigation will be reported later.

The stools of 29 children, aged from 2 to 12 years, were submitted for culture. The dates of admission corresponded fairly well in dis-

TABLE 2.—*Relation of Stool Characteristics and Bacteriologic Observations to Clinical Diagnosis in Children 2 to 12 Years of Age*

			Bacteriologic Observations							
Clinical Diagnosis	Stools Showing	Number	Sonne	Hiss-Russell	Flexner	Schmitz	Dispar (?)	Para B	Other Bacteria	Neg.
Acute intestinal intoxication	Blood alone.....	1	..	1	..	..	..	..	..	..
	No blood no pus	1	..	..	..	..	..	..	..	1
Infectious diarrhea.....	Blood and pus...	1	..	1	..	..	..	..	..	..
Fermentative diarrhea.....	Pus alone.....	1	..	..	..	..	..	..	1	..
Diarrhea unclassified.....	Blood and pus...	1	..	1	..	..	..	..	..	..
	Blood alone.....	2	..	1	..	..	..	..	1	..
	Pus alone.....	1	..	..	1	..	..	..	..	..
	Not examined...	1	..	..	..	..	..	..	..	1
Dysentery.....	Blood alone.....	1	..	..	..	..	..	..	..	1
	Not examined...	2	1	..	..	..	..	1	..	..
Convulsions.....	Blood and pus..	1	1	..	..	..	..	..	..	..
	Blood alone.....	1	1	..	..	..	..	..	..	..
	Neither.....	1	1	..	..	..	..	..	..	..
For observation.....	Pus alone.....	1	1	..	..	..	..	..	..	..
	Neither.....	1	1	..	..	..	..	..	..	..
	Not examined...	1	..	..	..	..	..	..	..	1
Other diagnosis.....	Blood alone.....	4	1	..	1	2	..	..	..	..
	Neither.....	2	..	..	..	..	1	..	..	1
	Not examined...	5	3	..	1	1	..	..	..	..
Totals.....		29	10	4	3	3	1	1	2	5

tribution with those of the infants, a number being admitted, however, somewhat later in the autumn. Only 1 case was fatal. The majority of these children had a history of more acute onset of clinical symptoms than was apparent in the infants, as in 16 cases there was a history of symptoms initiated not more than thirty-six hours prior to admission.

Blood and pus or either alone was observed in the stools in 15 cases. The occurrence of blood and pus or either alone with the relationship to the bacteriologic observations is shown in table 2. Dysentery bacilli were isolated in 12 of the 15 cases in which blood and pus or either alone was manifested. In addition, dysentery bacilli were cultivated from the stools in 9 cases in which there is no record of the presence of blood or pus. B. paratyphosus B was isolated from a stool that contained neither blood nor pus when examined. Thus in 22, or 76 per

cent, of the 29 cases there were dysentery or paratyphoid infections, as evidenced by the isolation from the stools of these organisms.

The serum in the cases of paratyphoid infection agglutinated the homologous culture in a dilution of 1:2,560. A dilution of 1:320 of the serum in a case in which the stool contained B. dysenteriae Hiss-Russell agglutinated this species. In testing 7 serums in cases of B. dysenteriae Sonne infection, 6 were found positive in dilutions of 1:40 to 1:1,280, and 1, negative. All serums tested gave negative results with B. schmitzii and B. asiaticus.

TABLE 3.—*Relation of Stool Characteristics and Bacteriologic Observations to Clinical Diagnosis of Infant Cases, 1931*

			Bacteriologic Observations								
Clinical Diagnosis	Stool Showing	Number	Sonne	Hiss-Russell	Flexner	Schmitz	Asiaticus	Dispar (?)	Paratyphoid	Other Bacteria	Neg.
Acute intestinal intoxication	Blood....	21	6	4	0	6	1	1	2	2	6
	No record	9	2	1	2	1	0	0	0	0	4
	Mucus....	3	2	0	0	0	0	0	1	0	0
Subtotal.....		33	10	5	2	7	1	1	3	2	10
Infectious diarrhea.....	No record	2	..	..	..	2	..	..	..	1	0
Fermentative diarrhea.....	Blood....	2	..	1	..	2	..	1	..	2	0
	No record	3	1	1	..	..	..	..	..	..	1
Dysentery.....	Blood....	1	..	..	..	1	..	..	..	1	..
Miscellaneous diagnoses.....	Blood....	2	1	..	..	..	..	..	..	..	1
	No record	1	..	..	..	1	..	..	..	1	..
Totals.....		44	12	7	2	13	1	2	3	7	12

It was not proposed to study a series of cases of summer diarrhea this autumn (1931). However, for certain reasons many specimens were submitted for culture. No examinations for the presence of blood or pus were carried out; nevertheless, these observations were recorded in many histories.

The stools of 44 infants, 11 of whom died, were cultured; 26 of these showed the presence of blood and 3 others of mucus.

Dysentery or paratyphoid bacilli were isolated in 19 of the 26 cases in which the stools contained blood; 7 were negative. B. dysenteriae Sonne was isolated in 2 cases; B. paratyphosus B was isolated in the third of the 3 cases in which the stools contained mucus. The stools in 10 cases, for which there was no observation with respect to the presence of blood, contained dysentery bacilli; in 5 cases there was no observation regarding the presence of blood, and no significant bacterial species was found. Table 3 shows the clinical diagnoses on admission to the hospital, the data with regard to blood in the stool and the bacterial species isolated therefrom.

The stools of 30 children, aged from 2 to 11 years, were examined bacteriologically. Only 1 death occurred. As was noted last year, the onset of clinical symptoms was more acute than in the infants, and the clinical diagnoses on admission to the hospital were more varied than the diagnoses applied to the symptom complex in the group of infants. Four children had a history of convulsions on admission.

Blood was noted in the stools of 14. Table 4 shows the clinical diagnoses in this older group with relation to the presence of blood in the stool and to the bacteriologic observations. From 7 stools, 4 of which showed blood, no organism other than B. coli was cultivated. Of the remaining 23 cases, dysentery bacilli were isolated in 8 cases in which the stools showed blood, and in 9 cases in which there was no

TABLE 4.—*Relation of Stool Characteristics and Bacteriologic Observations to Clinical Diagnoses of Older Cases, 1931*

			Bacteriologic Observations						
Clinical Diagnosis	Stool Showing	Number	Sonne	Hiss-Russell	Flexner	Schmitz	Dispar (?)	Other Bacteria	Neg.
Acute intestinal intoxication	Blood	2	0	0	0	0	0	0	2
	No record	10	0	2	0	3	1	2	3
Infectious diarrhea	Blood	4	0	1	0	1	2	1	1
Dysentery	Blood	4	2	0	1	0	0	0	1
Miscellaneous diagnoses	Blood	4	1	0	0	0	1	2	0
	No record	6	1	1	0	1	1	2	0
Totals		30	4	4	1	5	5	7	7

record regarding the presence of blood. Thus in 17, or about 57 per cent, of the cases there were dysentery infections, as shown by the isolation of the organisms from the stools. In this group of older children, as in the similar 1930 group, mixtures of pathogenic species were not usually observed.

No serologic tests were carried out with the serums of the 1931 infants or of the older children.

It is of interest to note that B. dysenteriae Sonne infections occurred in 3 adults, 1 male and 2 females. One of the latter was a nurse in the outpatient department of the hospital, who was off duty for a week, who had copious diarrhea with much blood in the stool and whose stool culture seemed to be almost pure B. dysenteriae Sonne. The presence of blood was noted in the stools of all adults.

To sum up the work carried out in the autumns of 1930 and 1931, the stools of 111 infants under 2 years of age have been examined, and 74, or 67 per cent, yielded pathogenic organisms, mainly, species of dysentery bacilli; the stools of 59 children, aged from 2 to 12 years, have been examined, and 39, or 66 per cent, yielded pathogenic organisms;

that is, the examination of 170 stools from infants and older children has resulted in the isolation of dysentery and paratyphoid bacilli from 113, or about 67 per cent. From the stools of this whole group there have been isolated 36 strains of B. dysenteriae Sonne, 15 of B. dysenteriae Hiss-Russell, 17 of B. dysenteriae Flexner, 47 of the Schmitz bacillus, 12 of B. dispar (?), 5 of B. asiaticus and 7 of B. paratyphosus B. The presence of blood in the stools in 15 cases in which no significant organism was cultivated suggests that the causal species had been missed, since blood in the stool in a case of summer diarrhea may be taken as indication of infection with some species belonging to the dysentery-paratyphoid group of gram-negative bacilli. The presence of blood does not indicate infection with any one species; it may accompany diarrhea in infection with any of the foregoing species. Blood was not observed in the stools in cases in which one or other species was isolated approximately as frequently as its presence was noted.

INCIDENCE

Occurrence of These Infections in Infants Who Are not Sufficiently Ill to Be Admitted to the Hospital.—The number of infants with diarrhea brought to the hospital's outdoor department during the epidemic season is some evidence of its incidence in children who are not sufficently ill to warrant hospitalization. Cultures were taken from 8 such babies. From 3, Schmitz' bacillus was isolated, and from 1, B. dysenteriae Sonne.

Mild Summer Diarrhea Produced by These Organisms in Better Cared-For Children.—Cultures were taken from 11 infants brought to Well Baby Clinics. Schmitz' bacillus was isolated from 3 and B. dispar (?) from 3. Two cultures were submitted from 2 private patients; from one, B. dysenteriae Sonne was isolated; from the other, the Schmitz bacillus.

Incidence of These Infections in Less Populous Districts.—From a small town in Ontario a culture was sent to the laboratory of the Ontario Department of Health. B. dysenteriae Sonne was isolated from this specimen. While the evidence is meager, there is every reason to believe that the various species of colon-paratyphoid-dysentery bacilli encountered in this investigation are widely distributed in Ontario as well as in Toronto.

Occurrence of Carriers and of Other Cases in Households Prior to or Coincident with the Hospitalized Case.—Since the beginning of this investigation in 1928, information with respect to the incidence in persons other than those hospitalized was sought from 27 families. In 17 of these, from 1 to 5 other persons, children or adults, were ill. Contact specimens were obtained from 63 persons. B. dysenteriae Sonne,

isolated from the stools of the patients admitted to the hospital, was cultivated from the stools of a contact from each of two households. One person from another family harbored Schmitz' bacillus, which was obtained from the infant in the hospital. Two persons, both of whom had diarrhea, had Schmitz' bacillus in their stools. This species was also isolated from the hospitalized infant. From the stools of 3 persons, 1 adult and 2 children, all of whom had diarrhea, B. dysenteriae Hiss-Russell and Schmitz' bacillus were cultivated. These species were obtained from 2 other children who were patients in the hospital. Three healthy adults in another household had the same species in their stools as were isolated from this baby's stool.

These observations indicate that the clinical conditions produced by these micro-organisms are infections acquired by the hospitalized patients from carriers or other cases.

TRANSMISSION OF INFECTIONS

The majority of the infants belonging to the 1928-1929 series were bottle fed. The bottle brought to the hospital with the infant was retained in 6 cases, and the feeding examined bacteriologically. No feeding was sterile. B. dispar (?) was isolated from the contents of 2 of these bottles.

The prevalence of flies seems to correspond closely with the incidence of summer diarrhea. There existed the possibility that flies were vectors of the bacilli isolated from the cases. Flies were caught in the home of an infant from whom Schmitz' bacillus was isolated; the whole family had been ill with a similar complaint, and from 2 members the same species was isolated. Schmitz' bacillus was isolated from 5 flies, and, in addition, Hiss-Russell dysentery bacilli from 4 of the 5. The same mixture was isolated from flies caught in a second household in which the infant was infected with the Schmitz bacillus. From flies caught in other households in different parts of the city in which there was no illness, strains of B. dispar (?) and strains of Schmitz' bacillus were obtained. Flies, therefore, probably have a rôle in the distribution of these organisms.

PRESENCE OF THESE MICRO-ORGANISMS IN THE INTESTINAL TRACT OF OTHER ANIMALS

Cultures were taken this autumn from 4 dogs and 4 cats. These animals had just been received by one of the university laboratories for experimental work. They had not been confined, nor had they received any special diet or treatment that might alter the intestinal flora. From 1 dog a strain of B. dysenteriae Hiss-Russell and from 3 cats Schmitz' bacillus were isolated. B. dispar (?) and B. dysenteriae Hiss-Russell were also obtained from 1 of these cats.

SUMMARY

In the autumns of 1930 and 1931, bacteriologic examination of the stools of 170 infants under 2 years of age and children, aged from 2 to 12 years, were examined. Approximately 67 per cent yielded pathogenic species of colon-dysentery-paratyphoid bacilli. One species was cultivated from the stools of 3 adults with dysentery. Blood and pus accompanied the infection in a large proportion of cases.

Agglutinins for some of the species isolated were demonstrated in the serum of a number of patients.

Carriers of the species isolated from these cases were found to exist in the population.

Flies may be possible vectors of these micro-organisms, which some domestic animals have been found to harbor.

ETIOLOGY OF MONGOLISM

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There are certain facts with regard to mongolism which must be explained by any hypothesis intended to account for this condition. No hypothesis heretofore presented will, in an unmodified form, avoid some conflict with available knowledge. These facts may be briefly summarized as follows:

1. When mongolism occurs in a pair of twins of the opposite sex, only one twin is affected.

2. When mongolism occurs in a pair of twins of the same sex, which are evidently dizygotic, only one member is affected.

3. When mongolism occurs in a pair of monozygotic twins, both members are affected.

4. Mongolism rarely occurs in more than one member of the same family.

5. Mongolism has been known to occur in three or even four members of a sibship.

6. The incidence of mongolism varies widely as a function of the age of the mother. Mongolian idiots [1] are progressively more prone to occur as the fertility diminishes with increasing age.

7. The increasing incidence of mongolism with the increasing age of the father is totally explainable as a result of the correlation between the ages of the parents.

8. The reproductive history of the mothers of mongolian idiots indicates that as a group they are less fecund than the mothers of normal children.

9. The birth of a mongolian idiot is much more frequently preceded by a long gap than is the birth of a normal child, even when the maternal age is controlled.

The first three statements favor a genetic explanation of mongolism. Unless modified, this explanation is incompatible with the sixth observation. The theory of uterine exhaustion obtains support from the sixth

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Studies from the Institute for Juvenile Research, Chicago, series C, no. 210.

1. The term mongolian idiot is used in order to follow the more conventional terminology. Unfortunately, this is a misnomer, as most of the children are not idiots, but imbeciles; neither are they mongolian.

observation, but no support from the eighth and ninth observations, and would require modification to make it compatible with the first and second observations. It may be more expeditious to proceed to a consideration of the evidence supporting each of these statements before considering further their harmonization with a hypothesis concerning etiology.

MONGOLISM IN TWINS

The occurrence of mongolism in twins has been reviewed by Bauer, Brousseau, Halbertsma, Macklin, Orel, Shattuck, van der Scheer and others. Twenty-one cases [2] have been reported in which mongolism occurred in a pair of opposite-sexed twins. In all cases, one twin was a mongolian idiot and the other was unaffected. There have been reported twenty-three sets of twins of the same sex in which mongolism occurred in one twin. In nine cases [3] evidence indicated that the twins were dizygotic. One case was reported as monozygotic. As Macklin has pointed out, this diagnosis must be considered questionable, as Orel,[2j] who cited the case, does not state whether Wieland gives the evidence on which this diagnosis was made. In the remainder of these cases [4] there is no published evidence to indicate whether the twins were dizygotic or monozygotic.

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2. (*a*) Armstrong: Brit. M. J. **1**:1106, 1928. (*b*) Bauer: Arch. f. Kinderh. **90**:169, 1930. (*c*) Cassel: Berl. klin. Wchnschr. **55**:159, 1917 (2 cases). (*d*) Comby, J.: Arch. de méd. d. enf. **20**:505, 1917 (2 cases). (*e*) Halbertsma, T.: Mongolism in One of Twins and the Etiology of Mongolism, Am. J. Dis. Child. **25**:350 (May) 1923 (3 cases). (*f*) Hultgren: Nord. med. arch., 1915, vol. 2, pt. 2. (*g*) Krabbe: Acta psychiat. et neurol. **1**:337, 1926 (2 cases). (*h*) McLean, S.: Mongolian Idiocy in One of Twins, J. A. M. A. **78**:13 (Jan. 7) 1922. (*i*) Neuman: Berl. klin. Wchnschr. **36**:210, 1899. (*j*) Orel, H.: Ztschr. f. Kinderh. **42**:440, 1926. (*k*) Peiper, cited by Orel. (*l*) Shattuck: Eugenical News **14**:134, 1929. (*m*) Shuttleworth, G. E.: Brit. M. J. **2**:661, 1909. (*n*) Swanberg, H., and Haynes, H. A.: A Case of Mongolism in One of Twins, Arch. Neurol. & Psychiat. **1**:717 (June) 1919. (*o*) Vas, J.: Jahrb. f. Kinderh. **61**:51, 1925. (*p*) Waring, J. I.: Mongolism in One of Twins, Am. J. Dis. Child. **41**:351 (Feb.) 1931.

3. (*a*) Clay, H. T.: Arch. Pediat. **39**:726, 1922. (*b*) Dietrich, H., and Berkley, H. K.: California & West. Med. **24**:498, 1926. (*c*) Gautier, P., and Coelytaux, P.: Arch. de méd. d. enf. **29**:459, 1926. (*d*) Jewesbury: Proc. Roy. Soc. Med. **18**:49, 1925. (*e*) Krabbe [2g] (2 cases). (*f*) Myers, C. S.: Proc. Roy. Soc. Med. **18**:69, 1925. (*g*) Orel, H.: Case P, Ztschr. f. Kinderh. **51**:31, 1931. (*h*) Petzoldt, G.: Monatschr. f. Kinderh. **47**:174, 1930.

4. (*a*) Cassel: Klin. Wchnschr. **5**:431, 1926. (*b*) Chown, G.: Canad. M. A. J. **17**:943, 1927. (*c*) Coupland, cited by Grieg: Edinburgh M. J. **34**:253 and 321, 1927 (2 cases). (*d*) Brousseau, K.: Mongolism, Baltimore, Williams & Wilkins Company, 1928. (*e*) Dietrich and Berkley.[3b] (*f*) Halbertsma [2e] (2 cases). (*g*) Mitchell, A. G., and Downing, H. F.: Am. J. M. Sc. **172**:866, 1926. (*h*) Orel, H.: Ztschr. f. Kinderh. **42**:440, 1926; Case F, ibid. **51**:31, 1931. (*i*) Moro, cited by Orel. (*j*) Siegert, cited by Orel.

Seven cases [5] have been published in which both twins were mongolian idiots. These cases are all regarded as monozygotic. When mongolism occurs in dizygotic twins, it affects only one member. The weight of evidence indicates that when mongolism occurs in monozygotic twins it always affects both members. This is the view of Bauer, Brousseau, Chown, Downing, Halbertsma, Macklin, McLean, Mitchell and Strauch.

THE OCCURRENCE OF MONGOLISM AMONG RELATIVES

In 1929, Macklin [6] collected records of 2,526 mongolian idiots in 2,491 families. There were but 30 instances in which more than 1 child in a family was a mongolian idiot. "There was one instance in which four were affected, three in which three mongols appeared, and twenty-six families in which there were two mongols. In addition to these cases in which brothers and sisters were affected, there were three instances in which first cousins were affected, one in which second cousins were mongolian idiots, and one instance in which a woman who had two sisters and a brother affected gave birth to a child similarly affected." The average number of children affected per family was only 1.014.

THE EFFECT OF THE AGE OF THE MOTHER

Shuttleworth [2m] called attention to the tendency of mongolian idiots to be born of elderly mothers. This tendency has been denied by numerous investigators who have tabulated the age of mothers at the birth of mongolian idiots and, finding such infants frequently born to young or relatively young mothers, have stated that the age of the mothers is not a factor in the occurrence of mongolism. It should be obvious that the importance of maternal age as a factor in the etiology of mongolism can be determined only by comparing the distribution of births of mongolian idiots by the ages of the mothers with the distribution of total births by the maternal age. As a result of the failure to recognize this elementary fact it has repeatedly occurred that an investigator has denied the importance of maternal age, while his own data have contained clear evidence of this important fact, which he failed to discover.

Chart 1 contains the distribution by age of the mother, of total births (3 sets of data) and of mongolian idiots (4 sets of data). The 3 distributions to the left are of single births excluding stillbirths, by white

5. Brückner: Deutsche med. Wchnschr. **52**:1279, 1926. de Bruin: Nederl. tijdschr. v. geneesk. **1**:712, 1902. Dickey, L. B.: California & West. Med. **26**:344, 1927. Hjorth, cited by Swanberg and Haynes.[2n] Krabbe.[2g] Reuben, M. S., and Klein, S.: Arch. Pediat. **43**:552, 1926. Strauch, A.: Mongolian Idiocy in Both Twins, J. A. M. A. **81**:2181 (Dec. 29) 1923.

6. Macklin, M. T.: Am. J. M. Sc. **178**:315, 1929.

mothers for the United States Birth Registration Area for the year 1927; single births, excluding stillbirths, by white mothers in California for the year 1927, and total births for the Netherlands for from 1906 to 1913.[7] The 4 histograms to the right of the figure are distributions by ages of the mothers of mongolian idiots collected by Brousseau [4d] (584 cases), van der Scheer [8] (316 cases), Goddard [9] (295 cases) and Orel [10] (104 cases).

If maternal age were of no importance in the occurrence of mongolism, one should expect the distributions of mongolian idiots to be

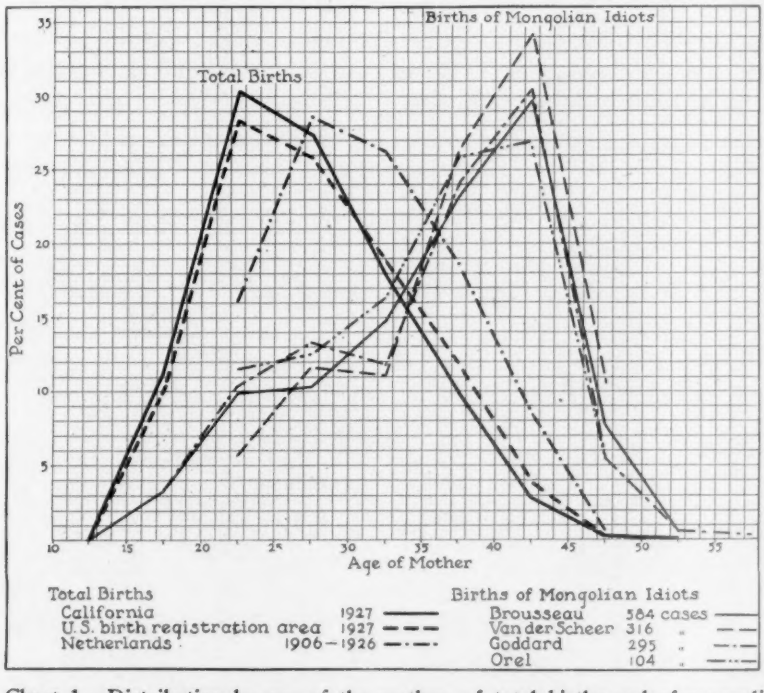

Chart 1.—Distribution by age of the mother, of total births and of mongolian idiots.

superimposed on the distributions of total births. Inspection of chart 1 will disclose that the peaks of the distributions of total births occur between 20 and 25 years or between 25 and 30 years, while the peaks of the distributions of mongolian idiots occur between 40 and 45 years.

7. Methorst, H. W.: D'economist **72**:489, 1923.

8. van der Scheer, W. M.: Abhandl. a. d. Neurol., Psychol. u. Psychiat. **44**:1, 1927.

9. Goddard, H. H.: Feeblemindedness: Its Causes and Consequences, New York, The Macmillan Company, 1926.

10. Orel, H.: Ztschr. f. Kinderh. **44**:449, 1927.

If the percentage of mongolian idiots born at a given age of the mother is divided by the percentage of total births at that age, a figure will be obtained which, as it deviates from unity, indicates the degree of paucity or excess of mongolian idiots born to mothers of that age. In order to avoid, so far as possible, introducing error through the use of noncomparable material, the American material of Brousseau and Goddard has been compared with the statistics of the United States Birth

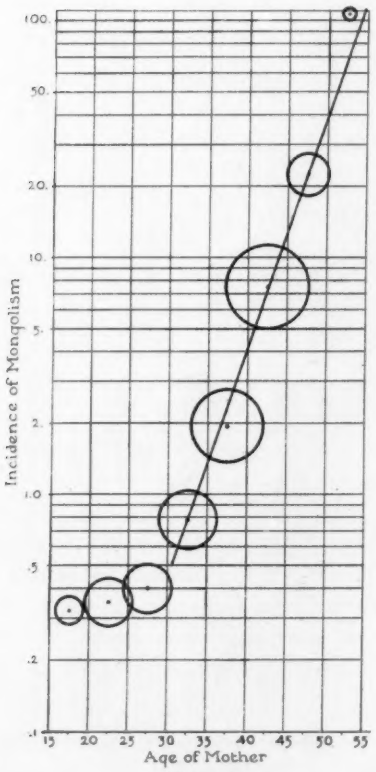

Chart 2

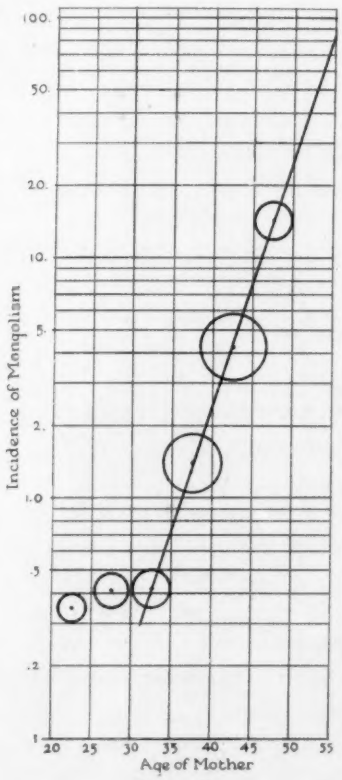

Chart 3

Chart 2.—The area of the circle is proportional to the number of cases of mongolism.

Chart 3.—The area of the circle is proportional to the number of cases of mongolism.

Registration Area, while the Dutch cases of van der Scheer and the Austrian cases of Orel have been compared with the Dutch statistics.

Charts 2, 3, 4 and 5 contain curves on these 4 sets of data, respectively. In them, the percentage of births of mongolian idiots divided by the percentage of total births has been plotted on a logarithmic scale, while the age of the mother has been plotted on a linear scale. This

procedure has been used to bring out the fact that from the age of 32 on, the proportion of total births which results in mongolian idiots behaves as a logarithmic function of the age of the mother. The last 5 points in charts 2 and 4 fall in excellent agreement with the straight line of logarithmic function drawn, while the last 4 points in charts 3 and 5 could scarcely be more accurately placed in straight lines. The importance of the age of the father will be considered before a rationalization of this surprising relationship is mentioned.

Table 1 [11] contains a comparison of values calculated from correlation tables of the age of the father and the age of the mother for 180 mongolian boys and 136 mongolian girls reported by van der Scheer, for 104 mongolian idiots reported by Orel and for 1,300,000 births in the Netherlands, from 1906 to 1913. It will be noted that the correlation

TABLE 1.—*Ages of Parents and Their Correlation with Total Births and Births of Mongolian Idiots*

Boys	Mean Age in Years		Difference: Father's Age Minus Mother's Age	Standard Deviation in Years		Correlation Coefficient
	Mother	Father		Mother	Father	
(a) Total births..... (Netherlands, 1906-1913)	31.08	33.66	2.58	6.22	7.11	0.74 ± 0.0004
(b) Mongolian idiots..... (van der Scheer, 180 cases)	36.83	39.56	2.73	7.35	7.74	0.78 ± 0.021
Difference (b) — (a)...	5.75	5.90	0.15			
Girls						
(c) Total births..... (Netherlands, 1906-1913)	31.13	33.71	2.58	6.23	7.09	0.74 ± 0.0004
(d) Mongolian idiots..... (van der Scheer, 136 cases)	38.75	39.52	0.77	6.18	6.95	0.75 ± 0.031
Difference (d) — (c)...	7.62	5.81	—1.81			

between the ages of the parents does not differ significantly for mongolian boys and mongolian girls on the one hand and for the total boys and the total girls on the other. It will be noted that the mean age of the parents is about six years higher for the mongolian children than for the normal children. It will further be noted that the difference in the ages of the parents is not significantly different for the two groups. The question has frequently been raised as to whether a difference in the

11. van der Scheer, Methorst and Orel may be criticized for the method of statistical presention of their material. All three writers, while using five year intervals in the middle section of the distribution, have grouped fathers over 50 in a single class interval regardless of whether they belonged in the interval 50-54, 55-59 or higher, and fathers under 20 in a single class interval and mothers under 20 in a single class interval. This procedure forces a certain error into any calculations based on the distribution. Fortunately, the error is probably small, and since it occurs in both bodies of data it will probably not invalidate their comparison. It has forced a curtailment, nevertheless, of the curves in charts 3 and 4 at the lowest age of the mother.

age of the parents is a factor in the etiology of mongolism. It is possible to state, on the basis of this evidence, that it is not.

It is concluded, therefore, that the parents of mongolian idiots show the same tendency to be of a corresponding age as the parents of normal children, and that the difference between the mean age of the father and the mean age of the mother is the same as for normal children. On the other hand, the ages of both parents show a marked tendency to be

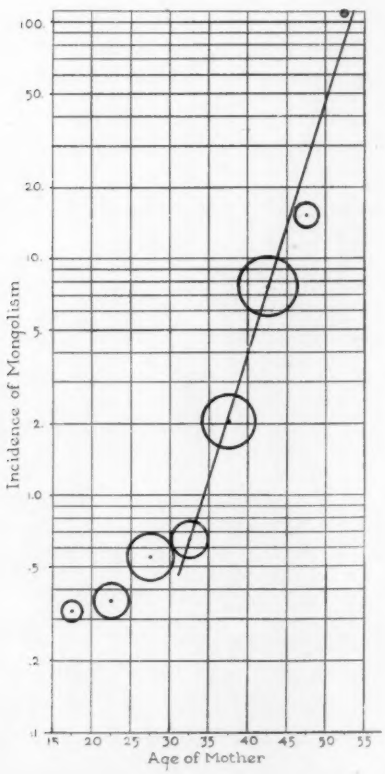

Chart 4

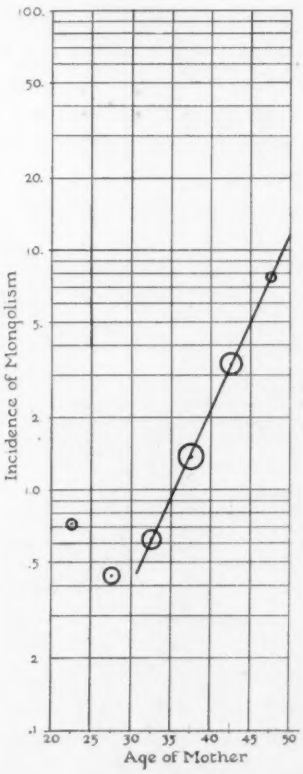

Chart 5

Chart 4.—The area of the circle is proportional to the number of cases of mongolism.

Chart 5.—The area of the circle is proportional to the number of cases of mongolism.

higher in the case of mongolian children, and it has already been shown that there is a significant relation between the age of the mother and the incidence of mongolism. The next problem is to determine whether or not the fact that the fathers of mongolian idiots are older than the average is due to an etiologic effect of paternal age per se or is due merely to the correlation between the ages of the parents.

Chart 6, the ordinate of which, like that of charts 2 to 5, is plotted on a logarithmic scale, contains the observed points from charts 2, 3, 4 and 5 and, in addition, points indicating the ratio of mongolian idiots for various age groups of fathers.[12] It will be noted that while the

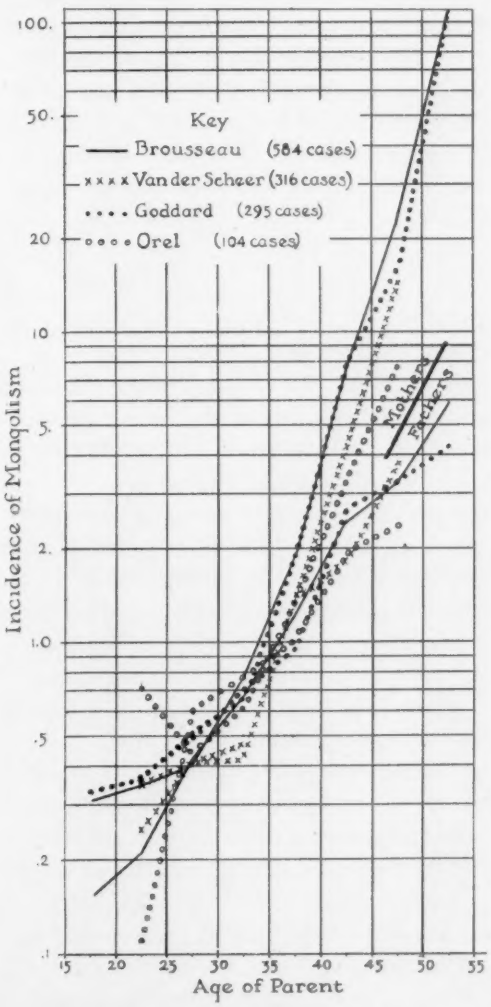

Chart 6.—Observed points from charts 2, 3, 4 and 5, with points indicating the ratio of mongolian idiots for various age groups of fathers.

12. While the figures for births by ages of the mothers from the United States Census are for births of white children, excluding stillbirths, those for births by ages of the fathers are for all births, excluding stillbirths. This was the only manner in which the latter data were available. The inclusion of Negro children would make no real difference in the shape of the maternal curves.

incidence of mongolism increases with the increasing age of the father, it does not rise to such a height as is the case with the age of the mother. This probably indicates (certainly suggests) that the relation to the age of the father is secondary owing to the correlation of the parental ages.

It is possible further to check this relationship by ascribing all of the relation of the incidence of mongolism to parent-age first to the age of the mother, and by calculating from the data of Methorst and van der Scheer the portion of mongolian idiots expected at each age of the father and comparing it with the observed figures. In order to do this, one takes the number of children of fathers from 15 to 19 years of age and of mothers from 15 to 19 years of age and calculates the expected number of mongolian idiots by multiplying by $\frac{316}{1,300,000}$ of the "mongol rate" of mothers from 15 to 19 years (chart 3). Similarly, one calculates the expected number of mongolian idiots among children whose fathers are from 15 to 19 years of age and whose mothers are from 20 to 24, and among those whose fathers are from 15 to 19 years of age and whose mothers are from 25 to 29, and so on. By totaling these, one obtains the expected number of mongolian idiots among all children of fathers from 15 to 19 years of age. This procedure is repeated for fathers from 20 to 24 years of age, and so on. One can then reverse the procedure and ascribe all of the effect of parent-age to the age of the father and make calculations of the expected distribution of mongolian idiots by the age of the mother. From the agreement or disagreement of these calculated distributions with the observed values one will have indications concerning the validity of each of these assumptions.

Charts 7 and 8 contain the results of the procedures. The calculated curve of chart 7 gives a reasonably good agreement with the observed values for a body of data of this size. If the χ^2 test of goodness of fit is applied, a χ^2 of 8.25 is obtained, which indicates the probability of obtaining a fit as bad or worse on the basis of chance deviation to be 0.22. One can, therefore, account for the relation between the incidence of mongolism and the age of the father as a result of the correlation of parental ages. On the other hand, the calculated curve of chart 8 deviates widely from observed values. χ^2 is found to be 169.25, and the probability of obtaining a fit as bad as this on the basis of chance factors is 0.00000+. This is proof that the relation between the incidence of mongolism and the maternal age is primary, and not a result of the relation between the incidence of mongolism and the age of the father.

This relationship of structural deviations to the age of the mother is not unique in the field of biology. Sewall Wright [13] has demonstrated a relationship between the age of the dam and the incidence of poly-

13. Wright, Sewall: Am. Naturalist **60**:553, 1926.

dactylism in inbred guinea-pigs. The color of the coat was also observed to be related to the age of the dam. *These characters were not wholly due to genetic factors. They could not be segregated.*

One might point out in passing that the successful practice of birth control in this country by women past 40 would result in a 36 or 38 per cent reduction in the number of mongolian idiots and only a 4 per cent reduction in the number of total births.

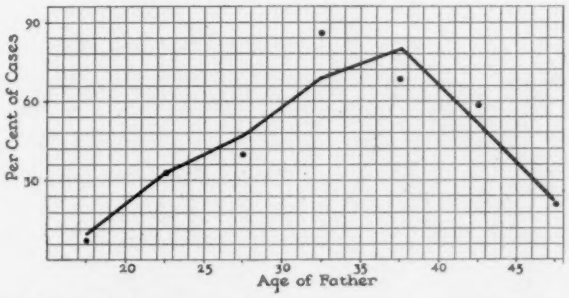

Chart 7.—The solid line represents the theoretical expectancy if the age of the mother is the determining factor. The dots indicate observed values.

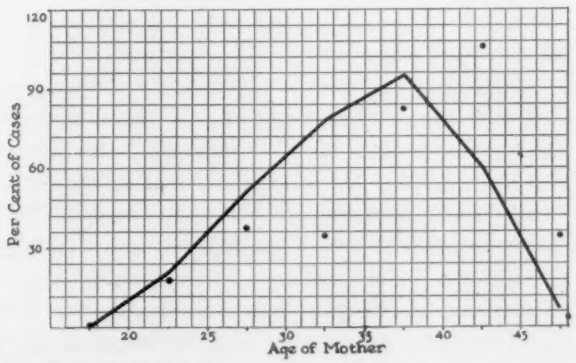

Chart 8.—The solid line represents the theoretical expectancy if the age of the father is the determining factor. The dots indicate observed values.

In order to form a judgment as to whether or not such a practice would be actually warranted, information concerning the incidence of mongolism in the community is needed. I have not been able to discover published statistics disclosing the portion of children born who are mongolian idiots, and it is difficult to obtain any significant material on this subject. I was fortunate in securing permission [14] to use material on

14. The management of the Presbyterian Hospital and Dr. N. Sproat Heany, Professor of Obstetrics and Gynecology, Rush Medical College, gave me permission to use their material.

births in the Presbyterian Hospital, Chicago, for the years from 1926 to 1931, inclusive. It is the practice at the Presbyterian Hospital to have new-born infants examined by a staff pediatrician. The diagnosis of mongolism or of normality in these cases, therefore, has been made by pediatricians. In the years from 1926 to 1931, 6 mongolian idiots were recognized among 3,818 births. This ratio may be expressed as 1 in 636, or 0.16 per cent. It is to be regretted that the material is not more extensive.

If one accepts 0.16 per cent as probably representing the approximate incidence of mongolism, then from previous findings one should expect about 1.2 per cent of the children born of mothers from 40 to 45 years of age, 3 per cent of the children born of mothers from 45 to 50 years of age and *17 per cent of the children born of mothers from 50 to 55 years of age to be mongolian idiots.* Fortunately few children are born to mothers past 50. I believe that the possibility of the birth of a mongolian idiot is sufficient to be worth consideration in the case of all women past 40.

THE LOW FECUNDITY OF MOTHERS OF MONGOLIAN IDIOTS

Shuttleworth [2m] stated that mongolian idiots were particularly prone to be borne of mothers toward the end of the reproductive period and especially to be the last born of a long series of children. It is now possible to point out that the controversy which has waxed over this question has been in part due to confusion resulting from the coupling of a correct and an incorrect statement by Shuttleworth. It has already been ascertained that a mongolian idiot is prone to be born to an elderly mother. This means that in comparing the families of mongolian idiots with the families of normal children, one will, if one is not cautious, find oneself comparing a group consisting predominately of completed families with a group of families chosen at random. Consequently, as a result of one's distorted perspective, one may obtain the impression that mongolian idiots are born in large families. Any valid comparison of family size must deal with completed families only, or must be controlled for the age of the mother. The mean position in the family for 800 cases collected by Brousseau is 4.07 ± 0.07. The distribution of the ages of the mothers is graphically represented for 584 cases of Brousseau in chart 1. These two series, consisting in the major portion of the same cases, would appear to be strictly comparable. From the statistics of the United States Birth Registration Area (1927) one may obtain the mean number of births of children born to mothers of any given age period. By weighting these age periods according to the number of mongolian idiots in one's data and calculating a mean, one reaches a figure representing the mean birth position of normal children for a

distribution of maternal age identical with that of the population of mongolian idiots. This mean is 5.52 ± 0.06. One finds, therefore, that when the factor of maternal age is controlled the mongolian idiots are found to be in families having an average of 1.45 ± 0.14 children less than the families of normal children.

LOW FECUNDITY IMMEDIATELY PRECEDES THE BIRTH OF A MONGOLIAN IDIOT

Another approach to the same problem is afforded by the study of Stekloven.[15] He compared the interval since the preceding birth in a population of 91 last-born infants who were mongolian idiots and whose mothers were past 40 with that of a population of 1,570 normal children whose mothers were past 40. Table 2 contains this comparison. It will be noted that the birth of a mongolian idiot is more frequently preceded

TABLE 2.—*Interval Since Last Birth—Mothers Over 40*[18]

Interval	1,570 Normal Births		91 Mongolian Idiots, Last-Born		Mongolian Idiots, Last-Born, Percentage of Expectation
	Number	Percentage	Number	Percentage	
1.....	299	19.05	10	11.0	58
2.....	586	37.32	17	18.7	50
3.....	294	18.73	18	19.7	105
4.....	183	11.65	11	12.1	104
5.....	95	6.95	9	9.9	142
6.....	43	2.74	6	6.6	241
7.....	36	2.29	6	6.6	288
8.....	14	0.90	3	3.3	367
9 and over..	20	1.37	11	12.1	883

by a long gap than is the birth of a normal child. This is most clearly brought out by referring to the right-hand column of table 2, which was obtained by dividing the percentage of birth of mongolian idiots by the percentage of normal births, and multiplying by 100, which gives the mongolian idiots in percentage of expectation. *The birth of a mongolian idiot is frequently preceded by a period of diminished fecundity.*

A HYPOTHESIS OF MONGOLISM

I am now in a position to consider what generalizations may be deduced from this agglomeration of facts. The relation of mongolism to twinning indicates that the explanation of mongolism must be sought in the germ cell. The relation of mongolism to the age of the mother and the progressive incidence of mongolism with diminishing fertility are not compatible with a simple genetic explanation. There are, therefore 4 possibilities, which may be summarized as follows:

15. Stekloven, cited by van der Scheer.[8]

1. Mongolism is a genetic character the expression of which is dependent on the age of the mother. Potential mongolism may be transmitted as a genetic character, but the expression of the condition is in some fashion controlled by maternal age, such as through some nonrandom selection of genes in the reduction process (resulting in a deviation from mendelian ratios) or some differential viability of zygotes related to the age of the mother.

2. The immediate cause of mongolism is a local pathologic change in the uterine mucosa. This would explain the occurrence of mongolism in both monozygotic twins (which have a single placenta) and the fact that in the case of dizygotic twins only one member is affected. In this case the rationalization would be that only one of the ova was implanted on the pathologic locus.

3. The etiology of mongolism is to be sought in a modification of the sperm cells by the toxic action of the secretions of the female generative tract, this toxic action being related to the age of the mother. This appears unlikely, but should be considered as a possibility.

4. Mongolism is due to a diminished viability of the ova.

The last explanation seems, at the present stage of knowledge, the most satisfactory. It would adequately explain all of the facts recorded in the beginning of this article.

The conception here introduced is that in the population of ova there is continually a certain mortality rate. In a period between that of complete viability and failure of reproductive function ova pass through a mongolian-genetic stage. In view of the relative infrequency of mongolism it would be unlikely that the two ova producing dizygotic twins should both be in this stage. On the other hand, monozygotic twins arising from a single ovum must necessarily be both mongolian idiots if affected at all. One would expect the occurrence of mongolism in more than one member of a sibship to be relatively uncommon and yet to occur with a little higher frequency than purely chance factors would explain, as low fertility is known to occur among the women of some families. One would expect, furthermore, that an increased incidence of mongolism would be associated with a diminished fertility. As the age of the mother increases the fertility is known to diminish. This diminution in fertility may be reasonably ascribed to a diminished reproductive viability of the ova. One would, therefore, expect an increasing incidence of mongolism among the children of women of advancing age. Furthermore, one would expect that mothers who give birth to mongolian idiots would tend, on the whole, to be of lower fecundity than the mothers of normal children. One would expect the birth of a mongolian idiot to be more commonly preceded by a long gap than the birth of a normal child.

Two questions immediately arise. Why should the incidence of mongolian idiots behave as a logarithmic function in mothers past 30, and why should the function break below this age? Answers must be speculative at best. Quite possibly further study will disclose that some other function will describe the relation of the age of the mother to the incidence of mongolian idiots more accurately. Yet logarithmic functions are common in dealing with populations and by my hypothesis I am dealing with population changes of ova. It seems not unlikely that the explanation for the break in this function should be that a phenomenon that has more than one contributing cause is being dealt with. It may well be that there are factors bringing about a diminished viability of a small number of ova in young mothers and that the diminishing viability, which is due to increasing maternal age, is simply superimposed on this. Such a condition would result in a relationship of the type noted.

CONCLUSIONS

1. The relation of mongolism to twinning (both members affected in monozygotic twin pairs, one member affected in dizygotic twin pairs) substantiates the belief that the immediate etiology of mongolism is to be found in the germ cell.

2. The association of mongolism with a diminished maternal fecundity (increasing age of the mother, small size of the family and frequency of an abnormally long interval before the birth of a mongolian idiot) supports the conception that the mongolian idiot is a product of fertilization of an ovum the viability of which is diminished.

3. The hypothesis that mongolism is due to a diminished viability of the ovum, short of complete failure of development, makes it possible to harmonize the superficially paradoxical evidence pointing toward the germ cell and maternal age as etiologic factors.

907 South Lincoln Street.

ELEVATIONS OF TEMPERATURE IN THE NEWLY BORN

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NEW ORLEANS
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NEW ORLEANS

During a period of over ten years observations have been made on the temperatures of the infants born in the inside division of the service of the newly born. These observations have been made beginning at birth and have continued at four hour intervals during the first nine or ten days of life and in some instances longer.

In the first years impressions were gathered with regard to the time at which the elevations of temperature occurred, and how they behaved, which stimulated the present study.

Over 5,000 records of cases have been closely scrutinized, and only those infants with elevated temperatures whose histories are complete in every detail and whose mothers' obstetric records are likewise thorough are included in this study.

Six hundred and seventeen such cases comprise the material studied. All temperatures were taken by rectum, and those above 99.6 F. were considered to be elevated.

It was found that the infants with elevated temperature could be classified into several groups as follows:

Group 1.—Infants with elevated temperature occurring from birth to, and including, the third day of life, in whom there was no relation between the elevated temperature and the loss of body weight.

Group 2.—Infants with elevated temperature in whom there was a distinct relation between the temperature and the loss of body weight. (This group was further divided into those with the early rises of temperature, namely, from the first to the third day, and those with the late rises, namely, from the fourth to the sixth day.)

From the Service of the Newly-Born, Department of Pediatrics, Touro Infirmary, New Orleans.

Read before the Louisiana State Pediatric Society, New Orleans, May 10, 1932.

Group 3.—Infants with elevated temperature which was prolonged. (In this group there was no relation between the elevated temperature and the loss of body weight.)

Group 4.—Infants with elevated temperature associated with abnormalities and disease.

Group 5.—Infants with elevated temperature associated with the toxemias of pregnancy.

When the statement is made that the temperature occurred on a stated day, it is meant that it occurred during that certain twenty-four hours, and not when the baby had completed that many days; for example, the fourth day means during that fourth twenty-four hours of life, from the end of the completed third day to the completion of the fourth day.

The mothers of the infants in this study were primiparas in 310 instances and multiparas in 260 instances, and the parity was unstated in 47 instances, showing that the study was not restricted to any parity.

An ice cap to the head and the administration of 2 ounces (59.2 cc.) of a 12 per cent lactose solution every four hours, 1 grain (0.065 Gm.) of sodium citrate every four hours and 1 minim (0.06 cc.) of spirit of ethyl nitrite every four hours were the only therapeutic measures employed for the elevated temperature in the cases included in this study.

GROUP 1

In group 1 there were 292 infants. The elevated temperatures occurred from birth to, and including, the third day.

The average duration of the fever for this group was 1.3476 days, or one day and eight hours. The mothers of these babies were primiparas in 145 instances and multiparas in 132 instances, and the parity was unstated in 15 instances.

The average loss of body weight of this group was 11.12 ounces (315.23 Gm.), the maximum loss of body weight being 2 pounds and 8 ounces (1,133.98 Gm.), and the minimum loss of body weight ½ ounce (14.17 Gm.). Here it must be recalled that in a previous study,[1] when the system in vogue was established for the conservation of heat, the average loss of body weight was found to be 6⅜ ounces (180.73 Gm.), and the period to regain the loss was six days. Only 16 per cent of the infants in this group returned to their birth weight before leaving the hospital. The period of residence in the institution of all the infants in this study averaged nine days.

In this group the deliveries were normal in 39 instances, or 13.33 per cent, and abnormal (as shown in the table) in 253, or 86.66 per cent, instances.

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1. DeBuys, L. R.: Observations upon the Newly Born—Temperature and Weight, Texas State J. Med. **20**:384 (Nov.) 1924.

Of these children with elevated temperatures, 23 showed other symptoms in addition to the fever, as follows: vomiting, cyanosis, pallor, difficult breathing, bruises, nystagmus, twitchings and convulsions. Of

Data on Deliveries of Six Hundred and Seventeen Infants

Deliveries	Groups					
	1	2A	2B	3	4	5
Number of cases	292	34	56	193	26	16
Abnormal pelvis	97	..	2	40	2	..
Abnormal pelvis and forceps	10	..	1	20	..	..
Abnormal pelvis and lacerations	9	..	1	1	..	..
Abnormal pelvis and abdominal cesarean section	5	..	1	7	..	..
Abnormal pelvis, version and extraction, forceps	1	..	1	1	..	..
Abnormal pelvis and medical induction	4	..	..	..	..	..
Abnormal pelvis and placenta previa	..	..	..	1	..	..
Abnormal pelvis and toxemia of pregnancy	..	..	..	1	..	2
Abnormal pelvis, abdominal cesarean section and toxemia of pregnancy	..	2	1	..	..	1
Abnormal pelvis, medical induction and toxemia of pregnancy	..	..	..	1	..	..
Breech presentation	7	..	1	8	2	..
Breech presentation and abnormal pelvis	6	..	1	3	..	..
Difficult labor	17	..	..	4	..	..
Face presentation, medical induction and toxemia of pregnancy	..	..	..	..	2	1
Face presentation, forceps and version and extraction	..	..	..	2	..	..
Forceps	25	..	1	23	1	..
Forceps, uterine inertia and abnormal pelvis	1	..	..	..	..	..
Lacerations	6	..	1	3	..	..
Medical induction	4	..	..	..	1	..
Medical induction and forceps	..	..	..	2	..	..
Medical induction and toxemia of pregnancy	..	..	..	1	..	2
Normal	39	31	35	32	5	0
Posterior position	23	..	5	5	1	..
Posterior position and abnormal pelvis	6	..	1	10	..	..
Posterior position and forceps	6	..	2	12	5	..
Posterior position and lacerations	2	..	..	..	..	..
Posterior position, abnormal pelvis and lacerations	..	..	1	1	..	..
Posterior position, abnormal pelvis and abdominal cesarean section	1	..	..	..	..	..
Posterior position, abnormal pelvis and forceps	11	..	..	5	2	..
Posterior position and version and extraction	..	..	..	2	1	..
Posterior position, abnormal pelvis and version and extraction	..	..	..	1	..	..
Posterior position, forceps and version and extraction	3	..	1	4	..	..
Posterior position, medical induction, forceps and version and extraction	1	..	..	..	..	..
Posterior position, abnormal pelvis and medical induction	..	..	..	..	1	..
Posterior position and toxemia of pregnancy	..	..	..	..	..	1
Posterior position, toxemia of pregnancy and forceps	..	..	..	1	1	1
Posterior position, abnormal pelvis, abdominal cesarean section and toxemia of pregnancy	..	..	..	..	1	1
Posterior position, abnormal pelvis, forceps, version and extraction and lacerations	..	..	..	1	..	..
Spontaneous delivery with excessive moulding	1	..	..	..	..	..
Toxemia of pregnancy	..	1	..	..	..	7
Toxemia of pregnancy and placenta previa	..	..	..	1	..	..
Unstated	1	..	..	..	..	..
Version and extraction	1	..	..	..	1	..
Version and extraction and placenta previa	2	..	..	..	..	..
Version and extraction and breech presentation	3	..	..	..	..	..
Episiotomy was performed in many of the foregoing cases	66	2	9	55	9	1
Deaths	6	0	0	0	6	0

these, 2 were proved at autopsy to have had cerebral hemorrhage. One other patient, who died, showed red blood cells in the cerebrospinal fluid, and 3 others died following a definite history of difficult delivery, making a total of 6 deaths in this group. These observations were made in the earlier cases. No routine spinal fluid examination

was conducted, as we believe that nothing can be accomplished by this procedure, and that it is more advisable not to reduce the spinal fluid pressure in the case of trauma or hemorrhage, unless symptoms of irritation or pressure occur.

The relation of the initial rise and the maximum temperature to the greatest loss of body weight is shown in chart 1.

In this chart it is shown that 44.4 per cent of the elevations began on the first day of life, 38.2 per cent on the second day and 17.4 per cent on the third day. The maximum temperatures occurred in 21.5 per cent on the first day, 52.1 per cent on the second day and 26.4 per cent on the third day. The maximum loss of body weight was found in 3.8 per cent on the first day, 20 per cent on the second day, 45.8 per cent on the third day, 10.1 per cent on the fourth day, 4.2 per cent

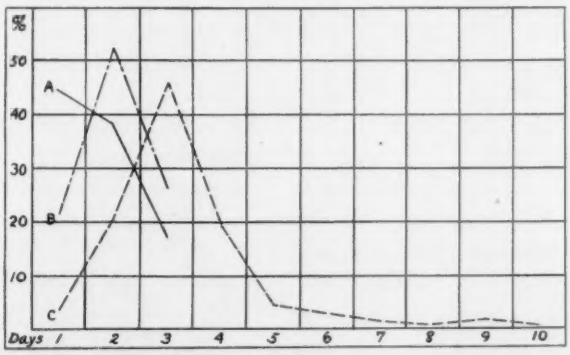

Chart 1.—The relation of the initial rise and the maximum temperature to the greatest loss of body weight for group 1. This relationship is also shown in the following charts for each group. In all the charts the solid line indicates the initial temperature; the unevenly broken line, the maximum temperature and the evenly broken line, the maximum loss of weight.

on the fifth day, 2.8 per cent on the sixth day, 1.4 per cent on the seventh day, 0.7 per cent on the eighth day, 1.8 per cent on the ninth day and 0.4 per cent on the tenth day.

There is no relation between the three curves. It is noticeable that the rise of the temperature curve and the maximum temperature curve preceded the curve for the maximum loss of body weight. The elevated temperatures in this group were considered to be due to trauma.

GROUP 2

In group 2 there were 90 infants. Of these, there were 34 (designated as 2A) with early rises of temperature, namely, from the first to the third day inclusive, and 56 (designated as 2B) with late rises of temperature, namely, from the fourth to the sixth day inclusive.

The average duration of the fever for subgroup 2A, or those infants with early elevations of temperature, was 1.4705 days, or one day and eleven hours. The mothers of these babies were primiparas in 15 instances and multiparas in 17 instances, and the parity was unstated in 2 instances. The average loss of body weight in this group was 11.79 ounces (334.24 Gm.), the maximum loss of body weight being 1 pound and 8½ ounces (694.57 Gm.) and the minimum loss of body weight 2½ ounces (70.84 Gm.). Only 11 per cent of the infants in this group returned to their birth weight before leaving the hospital. In this group the deliveries were normal in 31 instances, or 91 per cent, and abnormal (as shown in the table) in 3 instances, or 9 per cent.

In this chart the A curves show that 23.5 per cent of the elevated temperatures began on the first day, 44.1 per cent on the second day and 32.4 per cent on the third day. The maximum temperature occurred in 8.8 per cent on the first day, 35.3 per cent on the second day and 55.9 per cent on the third day. The maximum loss of body weight was found in 32.3 per cent on the second day, 55.9 per cent on the third day and 11.8 per cent on the fourth day.

The average duration of the elevated temperature for subgroup 2B, or those infants with the later elevations of temperature, was 1.3207 days, or one day and seven hours. The mothers of these babies were primiparas in 27 instances and multiparas in 22 instances, and the parity was unstated in 7 instances.

The average loss of body weight for this group was 11.8 ounces (334.52 Gm.), the maximum loss of body weight being 1 pound and 9¾ ounces (730 Gm.), and the minimum loss of body weight being 3¼ ounces (92.14 Gm.). Only 16 per cent of the infants of this group returned to their birth weight before leaving the hospital. In this group the deliveries were normal in 35 instances, or 63.5 per cent, and abnormal (as shown in the table) in 21 instances, or 36.5 per cent.

In this chart the B curves show that 76.3 per cent of the elevated temperatures began on the fourth day, 18.2 per cent on the fifth day and 5.5 per cent on the sixth day. The maximum temperatures occurred in 67.3 per cent on the fourth day, 25.4 per cent on the fifth day and 7.3 per cent on the sixth day. The maximum loss of body weight was found in 7.2 per cent on the third day, 54.5 per cent on the fourth day, 27.3 per cent on the fifth day, 9 per cent on the sixth day and 2 per cent on the seventh day.

Of these children with elevated temperatures in both subgroups A and B, there was a single infant who showed another symptom besides the elevated temperature, namely, difficult breathing. In the combined cases of subgroups 2A and 2B, 66, or 73.5 per cent, of the deliveries were normal and 24, or 26.5 per cent, were abnormal. There were no deaths in either of these subgroups.

The relation of the initial rise and maximum temperature to the greatest loss of body weight is shown in chart 2.

In both these sets of curves there is a distinct relation between the curves of the individual subgroups. The B curve for the initial rise in temperature and the B curve for the maximum temperature are coincidental with the B curve for maximum loss of body weight. The B curve for the maximum temperature shows that the onset of the high temperature was usually sudden. In the A curve practically the same relations are to be noted, except that the initial rise in temperature slightly preceded the maximum loss of body weight, but the maximum loss of body weight was coincidental with the maximum temperature. The elevated temperatures in this group were considered to be due to inanition.

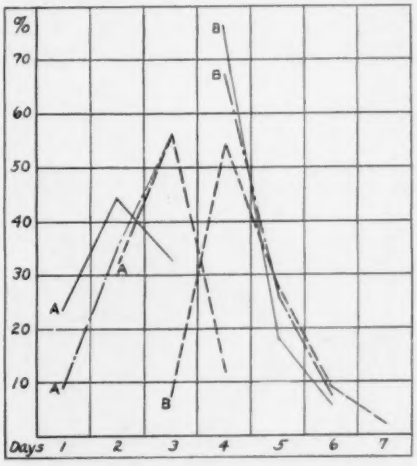

Chart 2.—Curves for group 2.

GROUP 3

In group 3 there were 193 infants with elevated temperatures which were prolonged.

The average duration of the fever for this group was 4.971 days, or four days and nineteen hours. The mothers of these babies were primiparas in 107 instances and multiparas in 74 instances, and the parity was unstated in 12 instances. The average loss of body weight of this group was 14.66 ounces (415.6 Gm.), the maximum loss of body weight being 2 pounds and 10½ ounces (1,204.85 Gm.) and the minimum loss of body weight 3 ounces (85.05 Gm.). Only 12 per cent of the infants in this group returned to their birth weight before leaving the hospital. In this group the deliveries were normal in 32 instances, or 16.66 per cent, and abnormal (see table) in 161 instances, or 83.33 per cent. Of these children with elevated temperatures, 18 showed

other symptoms besides the elevated temperature, as follows: vomiting, cyanosis, twitchings, strabismus and convulsions. Blood was found in the cerebrospinal fluid in 4 cases. The relation of the initial rise and maximum temperature to the greatest loss of body weight is shown in chart 3.

In this chart it is noted that 34.2 per cent of the elevations began on the first day of life, 37.9 per cent on the second day, 27.4 per cent on the third day and 0.5 per cent on the fourth day. The maximum temperature occurred in 6.3 per cent on the first day, 24.2 per cent on the second day, 36.3 per cent on the third day, 20 per cent on the fourth day, 7.4 per cent on the fifth day, 1 per cent on the sixth day, 2.6 per cent on the seventh day, 1.6 per cent on the eighth day and 0.6 per cent on the tenth day. The maximum loss of body weight was found in 2.6 per cent on the first day, 8.9 per cent on the second day, 25.8 per cent on the third day, 37.9 per cent on the fourth day, 10 per

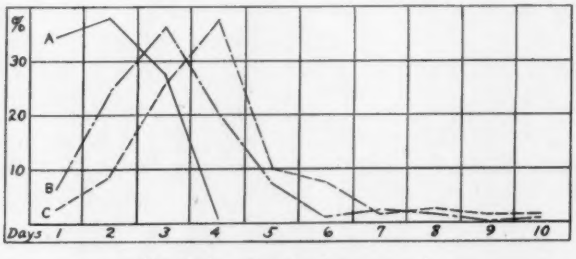

Chart 3.—Curves for group 3.

cent on the fifth day, 7.4 per cent on the sixth day, 1.6 per cent on the seventh day, 2.6 per cent on the eighth day, 1.6 per cent on the ninth day and 1.6 per cent on the tenth day.

The curves in this chart show no relation to one another. As in the first group the initial rises in temperature preceded the maximum temperatures and maximum losses of body weight. In this group, however, the curves, while not so high, are flattened out to cover a greater period of time. The duration of the elevated temperature was longer in this group than in the two preceding groups. There were no deaths in this group.

GROUP 4

In group 4 there were 26 infants with elevated temperatures associated with abnormalities and disease. Of these, 23 had proved cases of hemorrhagic disease of the newly born. The average duration of elevated temperature for this group was 6.0384 days. The mothers of these babies were primiparas in 13 instances and multiparas in 9 instances, and the parity was unstated in 4 instances. The average loss of

body weight of this group was 12.32 ounces (349.27 Gm.), the maximum loss of body weight being 1 pound and 9 ounces (708.75 Gm.) and the minimum loss of body weight ¾ ounces (21.26 Gm.). Only 7.7 per cent of the infants in this group returned to their birth weight before leaving the hospital. In this group, the deliveries were normal in 5 instances, or 19.2 per cent, and abnormal (see table) in 21 instances, or 80.8 per cent. In this group there was a total of 6 deaths, of which 5 were ascribed to hemorrhagic disease of the newly born and 1 to congenital heart disease and an enlarged thymus, as proved by necropsy.

The relation of the initial rise and maximum temperature to the greatest loss of body weight is shown in chart 4.

In this chart it is noted that 40 per cent of the elevated temperatures began on the first day of life, 28 per cent on the second day, 8 per cent on the third day, 4 per cent on each of the fourth, fifth, seventh and ninth days of life and 8 per cent on the sixth day of life.

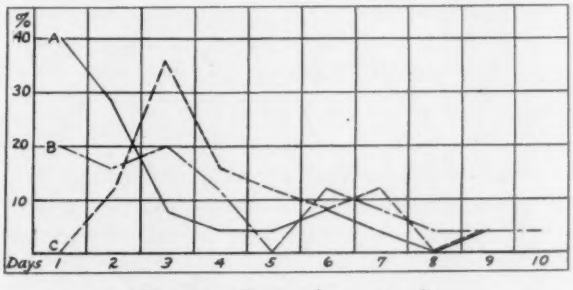

Chart 4.—Curves for group 4.

The maximum temperature occurred in 20 per cent of the cases on the first day, 16 per cent on the second day, 20 per cent on the third day, 12 per cent on each of the fourth and sixth days, 8 per cent on the seventh day and 4 per cent on the eighth, the ninth and the tenth day of life. The maximum loss of body weight was found in 12 per cent on the second day, 36 per cent on the third day, 16 per cent on the fourth day, 12 per cent on the fifth day, 8 per cent on the sixth day, 12 per cent on the seventh day and 4 per cent on the ninth day.

The curves in this chart are most irregular. The initial rises in temperature are among the earliest in the study, as are also the maximum temperatures, resembling in a measure the curves of groups 1 and 3, though not so high. It is significant that most of the deliveries of the infants of these three groups were abnormal, and all the deaths occurred in this group and group 1. The maximum loss of body weight followed about two days after the peak of the curve for the initial rise in temperature. Undoubtedly the factors present in the hemorrhagic disease of the newly born influenced the prolongation of all the curves.

GROUP 5

In group 5 there were 16 infants with elevated temperature associated with toxemias of pregnancy. The average duration of the fever for this group was 3.375 days, or three days and nine hours. The mothers of these babies were primiparas in 3 instances and multiparas in 6 instances, and the parity was unstated in 7 instances. The average loss of body weight in this group was 9.93 ounces (281.51 Gm.), the maximum loss of body weight being 1 pound and ½ ounce (467.77 Gm.) and the minimum loss of body weight 2½ ounces (70.87 Gm.). Only 16 per cent of the infants in this group returned to their birth weight before leaving the hospital. In this group all the deliveries, 16, or 100 per cent, were abnormal (as shown in the table). Of these children with elevated temperatures, 6 infants showed other symptoms besides fever as follows:

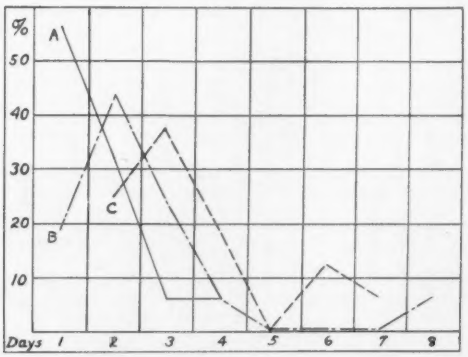

Chart 5.—Curves for group 5.

vomiting in 1 case and definite symptoms of hemorrhagic disease of the newly born in 5. In this group there was 1 death due to hemorrhagic disease of the newly born, which is also included in that group (group 4).

The relation of the initial rise and maximum temperature to the greatest loss of body weight is shown in chart 5.

In this chart it is noted that 56.25 per cent of the elevated temperatures began on the first day of life, 31.25 per cent on the second day and 6.25 per cent each on the third and fourth days of life. The maximum temperature occurred in 18.75 per cent of the cases on the first day of life, 43.75 per cent on the second day, 25 per cent on the third day and 6.25 per cent on each of the fourth and eighth days. The maximum loss of body weight was found in 25 per cent on the second day of life, 37.5 per cent on the third day, 18.75 per cent on the fourth day, 12.5 per cent on the sixth day and 6.25 per cent on the seventh day.

As might be expected, the symptoms began promptly in this group, with early elevated temperatures and early maximum temperatures. The loss of body weight followed both of the other curves.

COMMENT

Not only are the courses of the elevated temperatures in this study of interest from the point of view of duration, which may be short as is shown in groups 1, 2A and 2B, or prolonged as in groups 3, 4 and 5, but the mode of onset is also noteworthy. In group 1, which is associated with the maximum number of difficult labors and with 6 deaths, 86.66 per cent of the elevations not only began promptly but were sudden in their onset, reaching their maximum on the first day of the fever in 73.3 per cent of the instances. The order of frequency of the sudden onsets according to days was the second, first and third days, respectively.

In group 2, the A infants showed a sudden rise in 67.6 per cent of the instances, and the B infants in 89.33 per cent of the instances.

In the temperatures in groups 3, 4 and 5, the rises were sudden in 34, 42 and 50 per cent, respectively. While the number of cases in each of the two latter groups is small, there was quite a similarity in the cases in the individual groups.

What is of prime importance in study of elevated temperature in the newly born is the relation of the temperature, and its peak, to the body weight curve and the maximum loss of body weight. When the height of the fever is coincident with the maximum loss of body weight, especially when it occurs from the first to the fourth days, it is to be considered as a fever associated with inanition. These temperatures may be influenced by the administration of soluble carbohydrates and alkalis.

When the greatest height of the temperature does not correspond in time with the maximum loss of body weight, and precedes the latter, it must be looked on, especially if it occurs within the first three days of life, as being associated with the hazards of labor, and trauma or injury to the child must be considered as the most probable cause. These temperatures are not influenced by the administration of soluble carbohydrates and alkalis.

It must be emphasized that elevated temperatures in the newly born will contribute definitely to retard the progress of the infant as is shown in this study by the excessive loss of body weight and the delayed return to its birth weight. There is also a definite relation between the degree and duration of these fevers and the amounts of loss in body weight. In this study only a small percentage of the infants returned to their birth weight while in the hospital, whereas, in a group of normal controls, in the same service and with the same care, the

average loss of body weight was 6⅜ ounces (180.73 Gm.), and the time for the return to the birth weight was six days. The explanation of this is believed, therefore, to be due to the elevated temperatures.

CONCLUSIONS

Early rises of temperature are indicative of either trauma or inanition. If the peak of the temperature corresponds in time with the maximum loss of body weight, the fever is due to inanition; if there is no relation between the two except that the maximum loss of body weight follows the temperature curve, the cause is trauma.

The duration of the elevated temperature in these two types of cases (groups 1 and 2A) is usually short, namely, from one to three days.

The prolonged elevated temperatures of from three to nine days or more may be found in the diseases of the newly born, and in some of the instances of trauma.

Elevated temperatures retard the progress of the newly born, and the higher and the longer the elevated temperature, the greater its influence on retarding the progress of the infant, as shown by the excessive loss of body weight, and the delayed return to the initial weight.

There were 12 deaths in this study, 6 in group 1 and 6 in group 4; two of the groups in which a large proportion of the deliveries were abnormal.

When fever appears, and there is a relation between elevated temperature and loss of body weight (i. e., group 2B) as well as prompt improvement following the administration of soluble carbohydrates and alkalis, the case is one of inanition. If there is no response to this treatment, there must be some other influencing factor such as trauma.

If there are fever without relation to loss of body weight (groups 3, 4, 5) and no response to the administration of soluble carbohydrates and alkalis, the cause is trauma, the degree of which will influence the course of the illness. Indeed, it is possible that a combination of conditions may cause an elevated temperature.

There seemed to be a relation between trauma and the hemorrhagic disease of the newly born in this series, also between the toxemias of pregnancy and the hemorrhagic disease of the newly born, and acute inanition has been found associated with each of the causes of elevated temperature.

MOTILITY IN YOUNG INFANTS

I. RELATION TO BODY TEMPERATURE

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An important question in studies of motility in infants is concerned with the conditions of motility; that is, what factors affect motility? Among possible conditions are: nutritional status, hunger, the waking state, body temperature, pain, weight, size, bone development, calcium and creatinine output and amount of blood sugar before and after activity. The specific problem to be discussed here is what is the relation of body temperature in young infants to their motility?

The subjects used in this study were sixty-six infants under 16 days of age who were born in the obstetric department of the Iowa State University Hospital.

The apparatus for measuring motility—a Pratt experimental cabinet, a two-dimensional stabilimeter giving a relative measure of motility and a polygraph—together with the methods used have been described elsewhere.[1] The unit of motility is the number of oscillations (o/m) of the polygraph recording pens per minute. Rectal temperatures were recorded preceding the experiment.

The accompanying table includes the age of infants in hours and in days, the amount of motility in oscillations a minute (o/m) and the body temperature at birth and at the time of measuring motility. The table shows that infants range in age from 8 to 373½ hours, that the amount of motility varies from 0.6 to 275.2 o/m and that body temperatures vary from 96 to 101.6 F. The motility of seventy-three infants was measured; temperature records were made on sixty-six cases. This accounts for the omission of the records of some infants toward the end of the table.

When the amount of motility of these sixty-six young infants is correlated with their body temperatures on the day motility was measured, $r = -0.02 \pm 0.08$. It would appear from this value that there

From the Iowa Child Welfare Research Station, State University of Iowa.

1. Irwin, Orvis C.: The Amount of Motility in Seventy-Three Young Infants (unpublished investigation); The Distribution of the Amount of Motility in Young Infants Between Two Consecutive Nursing Periods (unpublished investigation); Motility in Young Infants: II. The Relation to Two Indexes of Nutritional Status, Am. J. Dis. Child, this issue, p. 534; The Amount and Nature of Activities of New-Born Infants Under Constant External Stimulating Conditions During the First Ten Days of Life, Genetic Psychol. Monogr. **8**:1, 1930.

Relation of Motility to Body Temperature

Infant	Age, Days	Age, Hours	Oscillations per Minute	Body Temperature (F.)	
				At Birth	During Experiment
1	1	8	5.5	98.0	98.0
2	1	10	1.9	98.4	99.2
3	1	20	2.5	97.0	98.4
4	2	30	0.8	98.0	98.0
5	3	49	2.5	99.6	98.4
6	3	70	42.4	98.8	99.2
7	4	74	23.3	98.2	98.6
8	4	80	0.9	98.0	98.6
9	4	94	32.9	98.2	98.4
10	5	97	54.2	98.6	99.0
11	5	113	37.8	98.8	99.0
12	6	139	9.9	98.0	98.4
13	6	140	124.1	100.0	98.0
14	7	148	21.2	99.0	98.2
15	8	169	6.4	98.6	98.8
16	8	177	2.4	97.2	98.4
17	9	197	37.4	97.2	99.2
18	9	201	175.2	98.0	98.8
19	9	213	10.7	98.0	98.8
20	10	239	68.7	98.8	98.6
21	11	250	49.6	98.0	98.8
22	11	263	24.3	97.0	99.0
23	12	276	25.9	98.0	98.0
24	12	284	16.0	98.2	98.0
25	12	287	0.8	98.0	100.0
26	13	294	27.8	98.0	98.8
27	14	320	80.3	98.4	98.6
28	15	339	2.6	99.0	98.4
29	15	342	62.1	99.2	98.6
30	16	365	2.6	98.4	98.8
31	8	180½	86.0	99.2	99.0
32	8	174	8.6	98.0	98.8
33	6	142½	46.6	98.8	99.0
34	3	54½	2.5	98.6	98.4
35	5	109	22.9	97.2	98.0
36	4	95	0.6	99.0	99.8
37	2	32	74.7	98.4	99.6
38	7	167½	107.5	98.2	98.0
39	2	34½	13.8	98.2	97.8
40	7	144½	18.9	97.8	98.6
41	2	41	1.3	98.6	99.0
42	2	60	36.7	98.4	99.0
43	12	282	83.4	98.2	99.0
44	9	207½	32.2	98.0	98.6
45	11	251	61.6	97.8	98.6
46	7	130½	4.2	98.0	99.0
47	7	154½	39.9	98.4	98.2
48	16	373½	19.3	98.0	98.6
49	10	233½	32.6	97.8	99.4
50	1	19	28.2	99.0	99.0
51	3	64½	44.4	99.4	101.6
52	10	225	10.4	100.1	98.6
53	5	116½	38.3	99.0	98.4
54	10	220½	4.2	97.8	98.6
55	13	288½	44.6	100.1	98.6
56	11	258	68.6	98.6	98.6
57	7	157	50.6	96.0	98.8
58	13	302½	50.4	101.2	98.8
59	4	96	1.1	98.0	99.2
60	10	240	50.4	98.0	98.0
61	9	258	32.6	99.2	96.0
62	14	333	28.6	98.0	99.2
63	10	235	5.4	100.0	99.0
64	2	26½	13.3	97.0	99.2
65	8	171	14.6	100.0	98.2
66	6	136	24.6	96.4	97.4

is little relationship between body temperature and the amount of motility. Since the records of body temperature at birth were available, the relation with the amount of motility on experimental days was determined. It was found that $r = 0.06 \pm 0.08$.

It is apparent from the low correlation that body temperature is hardly a significant factor in motility of young infants.

As a further check on this result, the significance of the difference of the mean oscillations per minute for the twenty infants who had the highest temperatures and the mean motility of the twenty-two infants with the lowest temperatures was calculated. The accompanying tabula-

Temperature	Infants	Mean Oscillations per Minute	Standard Deviation	Standard Deviation of the Mean Error
99–101.6	20	30.1	23.9	5.2
96– 98.4	22	30.5	33.2	7.1

tion shows that the twenty infants with highest temperatures (99 degrees and above) have a mean motility of 30.1 o/m, and that the twenty-two infants with the lowest temperatures (98.4 F. and below) have a mean of 30.5 o/m. The difference of 0.4 o/m is insignificant, as evidenced by the fact that there are 48 chances in 100 that it is not a true difference.

SUMMARY

When the motility of sixty-six young infants measured by the stabilimeter-polygraph technic is correlated with their body temperatures, the correlation is practically zero, as $r = -0.02 \pm 0.08$. Likewise, there is no significant difference between the amount of motility of twenty infants with the highest body temperatures and the motility of twenty-two infants with the lowest body temperatures. When motility is correlated with body temperature at birth, $r = 0.06 \pm 0.08$.

It may be concluded from these findings that motility in these young infants is not significantly affected by body temperature.

MOTILITY IN YOUNG INFANTS

II. RELATION TO TWO INDEXES OF NUTRITIONAL STATUS

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PROBLEM

In previous reports [1] the relation of motility in new-born infants to the waking condition and to hunger were considered. The present problem is concerned with the relation of the amount of motility in sixty-six young infants to their nutritional status. The specific question to be considered is: Does the nutritional status affect motility in young infants?

METHOD AND APPARATUS

The apparatus and the methods of measuring motility have been described in another connection.[1b] The nutritional status of the infants was determined according to two methods, one reported by Pirquet [2] and the second by Finlay.[3] Pirquet has evolved a formula for the nutritional status of children. It is:

$$\sqrt[4]{\frac{10 \times \text{weight in grams}}{\text{sitting height}}}$$

He holds that the index is applicable to children of all ages. Subjects with a nutritional index ranging from 95 to 100 are considered normal; those above 100 are overfed, while those below 95 are considered undernourished.

Finlay's [3] tables were specifically designed for the determination of the nutritional status of infants. His norms are based on the examination of 350 infants. The physical measurements and clinical procedures were conducted by Finlay, and include an examination of the quality of the blood, the fat content, the tension of the skin and the development of the muscles, all of these criteria being taken over from Pirquet's method. Finlay's procedure varied from that of Pirquet in

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From the Iowa Child Welfare Research Station, State University of Iowa.

1. (*a*) Irwin, Orvis C.: The Distribution of the Amount of Motility in Young Infants Between Two Consecutive Nursing Periods, Am. J. Dis. Child. this issue, p. 531; (*b*) The Amount and Nature of Activities of New-Born Infants Under Constant External Stimulating Conditions During the First Ten Days of Life, Genetic Psychol. Monogr. **8**:1, 1930.

2. Pirquet, C. F., von: Sitzhöhe und Körpergewicht, Ztschr. f. Kinderh. **14**: 211, 1916.

3. Finlay, T. G.: An Investigation upon the Value of Two Methods of Estimating Nutrition in Infancy, Edinburgh M. J. **31**:317, 1924.

that instead of using the sitting height he employed the standing height as a factor in his ratios, relating the weight-height to the height-age of the infant. Finlay's tables are not reproduced here. He classified infants on the basis of these tables into: fat, 121 to 125; well nourished, 90 to 120; poorly nourished, 80 to 90; emaciated, below 80.

Table Showing Motility in Sixty-Six Infants and Indexes of Nutritional Status

Infant	Age, Hours	Oscillations per Minute	Nutritional Indexes		Infant	Age, Hours	Oscillations per Minute	Nutritional Indexes	
			Pirquet	Finlay				Pirquet	Finlay
1.....	8	5.5	97	118	34.....	54½	2.5	95	107
2.....	10	1.9	94	107	35.....	109	22.9	97	116
3.....	20	2.5	100	117	36.....	95	0.6	93	112
4.....	30	0.8	86	95	37.....	32	74.7	93	105
5.....	49	2.5	91	102	38.....	167½	107.5	91	118
6.....	70	42.4	91	93	39.....	34½	13.8	97	100
7.....	74	23.3	91	105	40.....	144½	18.9	94	116
8.....	80	0.9	92	107	41.....	41	1.3	93	107
9.....	94	32.9	103	102	42.....	60	36.7	94	106
10.....	97	54.2	110	111	43.....	282	83.4	96	112
11.....	113	37.8	108	118	44.....	207½	32.2	94	100
12.....	139	9.9	91	115	45.....	251	61.6	94	100
13.....	140	124.1	103	125	46.....	130½	4.2	92	99
14.....	148	21.2	95	117	47.....	154½	39.9	95	112
15.....	169	6.4	102	105	48.....	373½	19.3	95	104
16.....	177	2.4	89	96	49.....	232½	32.6	95	99
17.....	197	37.4	96	109	50.....	19	28.2	90	108
18.....	201	175.2	96	102	51.....	64½	44.4	95	69
19.....	213	10.7	114	...	52.....	225	10.4	89	99
20.....	239	68.7	98	102	53.....	116½	38.3	86	92
21.....	250	49.6	93	115	54.....	220½	4.2	90	100
22.....	263	24.3	104	102	55.....	288½	44.6	95	103
23.....	276	25.9	96	119	56.....	258	68.6	96	111
24.....	284	16.0	98	123	57.....	157	50.6	100	124
25.....	287	0.8	74	60	58.....	302½	50.4	94	105
26.....	294	27.8	107	116	59.....	96	1.1	95	114
27.....	320	80.3	91	111	60.....	240	50.4	97	120
28.....	339	2.6	94	111	61.....	208	32.6	87	98
29.....	342	62.1	90	95	62.....	333	28.6	90	101
30.....	365	2.6	103	108	64.....	235	5.4	93	111
31.....	180½	86.0	97	113	65.....	26½	13.3	91	107
32.....	174	8.6	99	121	69.....	171	14.6	90	99
33.....	142½	46.6	95	112	72.....	136	24.6	95	101

RESULTS

The accompanying table gives the age in hours of the sixty-six infants and the amount of motility of these infants in oscillations per minute of the recording pens of the polygraph used to measure the motility under the same experimental conditions as previously reported. It also gives the Pirquet and Finlay values of the nutritional condition of these infants. The table shows that the ages varied from 8 to 373½ hours, that the motility ranges from 0.6 to 175.2 oscillations per minute and that the Pirquet index varied from 74 to 114 and the Finlay index from 60 to 125.

RELATION OF MOTILITY TO PIRQUET'S INDEX OF NUTRITIONAL STATUS

When the motility in terms of oscillations per minute is correlated with Pirquet's values for the nutritional status of these sixty-six young infants, a correlation of -0.13 ± 0.08 is obtained. Apparently there is little correlation between these two arrays of values.

By classifying these infants according to the Pirquet nutritional index into overfed, normal and undernourished, it is found that nine infants are overfed, thirty-two are normal, and twenty-five are undernourished. The mean oscillations per minute for the nine overfed infants are 35.6; for the thirty-two normal infants, 37.4, and for the twenty-five undernourished infants, 25.6. When the significance of the difference in the amount of motility of the overfed and undernourished infants is calculated according to Fisher's method,[4] which makes a correction for a small number of cases, $n = 32$, $t = 0.786$, and $P = 0.4+$. This P value is clearly not significant. When the probability of the difference in motility of the overfed and normal infants is calculated $n = 37$, $t = 0.013$, and $P = 0.9+$. The probability that this difference is significant is very small. The probability of the difference in motility of the normal and undernourished infants is likewise low, Fisher's values being $n = 55$, $t = 0.989$, $P = 0.3+$. Thus the overfed, the normal and the undernourished infants as classified according to Pirquet's indexes show small significant differences in amount of motility.

From the foregoing analysis it follows that the nutritional condition of these infants as estimated by the Pirquet method does not have a significant effect on the motility of the infants.

RELATION OF MOTILITY TO FINLAY'S INDEX OF NUTRITIONAL STATUS

Pirquet's values were held by him to apply to children of all ages. Finlay's values were arrived at after examination of 350 infants. It might be supposed, therefore, that any distortion of Pirquet's indexes will be corrected in Finlay's tables, with the consequent effect that some positive relationship might be obtained between his index of nutritional status and the amount of motility of these sixty-six young infants.

Such, however, is not the case. When the values for motility and nutritional status as determined by Finlay's method are correlated, a result of 0.007 ± 0.08 is obtained. In other words, no correlation

4. Fisher, R. A.: Statistical Methods for Research Workers, in Biological Monographs and Manuals (no. V), Statistical Methods for Research Workers, ed. 2, London, Oliver & Boyd, 1928, pp. 69.

between motility and nutritional status exists on the basis of either method.

Finlay classified infants' nutritional status according to his indexes into five groups: obese, fat, well nourished, poorly nourished and emaciated. Since our cases are few, for purposes of comparison the obese and fat infants (hereafter called fat) will be treated as a single group. Likewise the poorly nourished and emaciated cases (hereafter called poorly nourished) are grouped together. According to this arrangement sixteen of the sixty-six infants are fat, forty-seven are well nourished, and three are poorly nourished.

The motility for the sixteen fat infants averages 39.4, for the forty-seven well nourished infants 30.5, and for the three poorly nourished ones 27.8 oscillations per minute. The average differences are fairly large. The question is whether they are significantly large.

When Fisher's method is used for calculating the significance of the difference of the fat and poorly nourished groups, the values are $n = 18$, $t = 0.382$, and $P = 0.7$, a value not at all significant.

However, since there are only three cases of poorly nourished infants according to this index, the procedure is open to question. In order to avoid this criticism the significance of the difference of the fifteen infants at the high end of the entire group and the fifteen infants at the low end was calculated. The mean motility of the former was 37.9 oscillations per minute, of the latter 23.7 oscillations per minute, the difference being 14.2 oscillations per minute. Fisher's values are: $n = 28$, $t = 0.639$, and $P = 0.5$, which clearly indicates that the difference although large is not significant.

When values for the significance of the difference of the sixteen cases in the fat group and the forty-seven cases in the well nourished group are calculated, they are found to be $n = 61$, $t = 0.937$, $P = 0.4$. There is, therefore, no significant difference between the motility of these two groups. The values for the well nourished and poorly nourished groups are: $n = 48$, $t = 0.020$, $P = 0.9+$.

It follows, then, that the average differences in motility of infants classified for nutritional condition by the Finlay method are hardly significant although they are fairly large. This finding is consistent with the result, when the Pirquet method of classification is used, although the two methods classify these sixty-six infants differently.

The conclusion to be drawn from the foregoing analysis is that the amount of motility in young infants is not related to their nutritional status.

INFANT NUTRITION

VII. LACTIC ACID MILK; HAS IT SOLVED THE PROBLEMS OF INFANT NUTRITION?

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DEVELOPMENT OF THE THEORY AND USE OF LACTIC ACID MILK

Since 1889, the theory of lactic acid milk has been begging to be announced. One arises from a review of the literature fascinated and with ever-increasing respect for one's predecessors. They knew the basic facts. Incomplete clinical facilities and a desire to shape these facts according to the scientific trends in bacteriology and metabolism then current led them to overlook the interpretation now considered important.

The theory of lactic acid milk rests on four substantial columns of evidence:

1. *The High Buffer of Cow's Milk.*—In 1889, Escherich,[1] by simple titration, showed that cow's milk binds from two to three times as much acid as breast milk. He ascribed the low acidity of the gastric contents of artificially fed infants to this property and later calculated that the digestion of 1 liter of cow's milk required 3 liters of gastric juice. In 1888, Hans Leo[2] pioneering in the use of the stomach tube, van Putteren[3] and, in 1889, Einhorn,[4] in this country, demonstrated the acid-binding properties of milk, but apparently Escherich, Heubner[5] and W. Muller[6] first appreciated its clinical significance. By 1892 the latter had already shown that 58 per cent of the buffer of cow's milk lay in the protein and 42 per cent in the mineral. The high acid-binding properties were discussed in the early texts of Finkel-

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From the Sarah Morris Hospital for Children.

The routine urinalyses were done by Dr. M. L. Spivek.

Read in abstract at the Chicago Society of Internal Medicine, March 28, 1932.

1. Escherich, T. H.: Verhandl. d. Versamml. d. Gesellsch. f. Kinderh. . . . deutsch. Naturf. u. Aerzte **7**:106, 1889.

2. Leo, Hans: Berl. klin. Wchnschr. **25**:981, 1888.

3. van Putteren, quoted by Heubner, O.: Jahrb. f. Kinderh. **32**:27, 1891.

4. Einhorn, Max: New York M. J. **50**:67, 1889.

5. Heubner, O.: Jahrb. f. Kinderh. **32**:27, 1891.

6. Muller, W.: Jahrb. f. Kinderh. **34**:439, 1892.

stein,[7] Czerny and Keller[8] and Thiemisch[9] and in the individual publications of Kronenberg,[10] Rudolph Hess[11] and Allaria.[12] Improvement in methods of hydrogen ion determination led Hans Aron[13] to repeat the observations, and by 1914 he had brought the knowledge of the buffer of cow's milk to much the same state as today's.

For some reason little attention was paid to the subject by early writers in this country. It is mentioned by Alfred Hess,[14] and Clark[15] cited it as evidence against giving alkalis to aid gastric digestion.

The early observers were not blind to therapeutic possibilities. Cohn,[16] experimenting with the acid-binding properties of peptones in 1889, spoke of the well known fact that peptones bind acid and thus delay digestion. He quoted Minkowski as stating that the binding of acids by protein in the stomach facilitates bacterial growth. Von Jaksch[17] in 1890 spoke of confusion in gastric analyses from the use of milk, stating that meat bound much less acid. Cloetta[18] later confirmed this in animal experimentation. With a startling premonition of what was to come, W. Muller[6] in 1892 studied the acid-binding properties of the milk of various animals in order to find one approximating human milk. He showed that cow's milk itself varies, new milkers binding four times as much acid as breast milk and old milkers only twice as much. One year later Langermann[19] demonstrated that the number of bacteria in stomach contents varies with the amount of free hydrochloric acid. He found many more organisms in the gastric contents of artificially fed infants, and explained this on the basis of the reduced acidity due to the high buffer of cow's milk. How did pediatricians overlook the work of Allaria?[12] In 1908, with an unperfected hydrogen ion technic, he confirmed the work of previous observers and suggested that the high buffer of cow's milk was respon-

7. Finkelstein, H.: Lehrbuch der Säuglingskrankheiten, Berlin, H. Kornfeld, 1905, pt. 1, pp. 81 and 82.

8. Czerny, Adalbert, and Keller, A.: Des Kindes Ernährung, Ernährungsstörungen und Ernährungstherapie, Vienna, Franz Deuticke, 1906, pt. 1, p. 440.

9. Thiemisch, in Feer, Emil: Lehrbuch der Kinderheilkunde, Jena, Gustav Fischer, 1911.

10. Kronenberg, R.: Jahrb. f. Kinderh. **82**:401, 1915.

11. Hess, Rudolph: Ztschr. f. Kinderh. **12**:409, 1915.

12. Allaria, G. B.: Jahrb. f. Kinderh. **67**:123, 1908.

13. Aron, Hans: Jahrb. f. Kinderh. **79**:288, 1914.

14. Hess, A. F.: The Gastric Secretion of Infants at Birth, Am. J. Dis. Child. **6**:264 (Oct.) 1913.

15. Clark, William: J. M. Research **31**:431, 1914.

16. Cohn, F. O.: Ztschr. f. physiol. Chem. **14**:75, 1889-1890.

17. von Jaksch, R.: Ztschr. f. klin. Med. **17**:383, 1890.

18. Cloetta: München. med. Wchnschr. **2**:1329, 1902.

19. Langermann: Jahrb. f. Kinderh. **35**:88, 1893.

sible for many difficulties in digestion, in that the insufficient acidity of the gastric contents permitted undigested protein to enter the intestine.

Other observers shifted the scene to the field of metabolism. Raudnitz [20] in 1890 suggested the addition of hydrochloric acid to cow's milk to facilitate the digestion of minerals, and Soxhlet [21] in 1900 used the idea of saturating the buffer with acid for his study of rickets. He wished to procure free acid for mineral digestion, but, fearing hydrochloric acid, suggested that the additional demands on the stomach made by cow's milk could be overcome by the addition of sodium chloride.

It is quite clear that the acid-binding properties of cow's milk and the diminished amount of free acid in gastric contents of babies fed cow's milk were well known to the early writers. They interpreted these findings, however, in terms of the importance of free acid for gastric asepsis and mineral metabolism.

2. *The Clinical Success of Buttermilk.*—De Mattos [22] said that since 1770 buttermilk has been used by Europeans for young pigs, calves and babies. Saldun [23] gave credit to Nil Rosen de Rosenstein for first officially recommending buttermilk as an infant food in 1793. It then diminished in popularity, and was reintroduced in France by Pehu in 1907 and by Marfan in 1909. De Mattos, stimulated by Heubner, introduced the food into Germany in 1902, though he said that it was popularized in Holland by Ballot in 1865 and by de Jaeger in 1895. The popularity of buttermilk as an infant food is attested by the number of explanations offered for its success: sterility of milk, fine curd, low fat, lactic acid bacilli, effect of lactic acid on metabolism, gastric and intestinal asepsis, effect on peristalsis, effect of the food combination on metabolism and combinations of these.[24]

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20. Raudnitz, R. W.: Ztschr. f. physiol. Chem. **14**:1, 1890.

21. Soxhlet: München. med. Wchnschr. **47**:1658 and 1699, 1900.

22. de Mattos, Teixeria: Jahrb. f. Kinderh. **55**:1, 1902.

23. Saldun, M. L.: Arch. de méd. d. enf. **34**:341, 1931.

24. Caro, W.: Arch. f. Kinderh. **55**:40, 1902. van Massenick, G.: Jahrb. f. Kinderh. **55**:40, 1902. Wurtz, A.: Med. Klin. **1**:1391, 1904. Rensburg, H.: Jahrb. f. Kinderh. **59**:74, 1904. Rummel, O.: Therap. d. Gegenw. **7**:259, 1905. Tada, G.: Monatschr. f. Kinderh. **4**:118, 1905. Dercherf, Elie: Ann. de méd. d. enf. **8**:1, 1905. Dunn, C. H.: Arch. Pediat. **24**:241, 1907. Klotz, M.: Jahrb. f. Kinderh. **70**:1, 1909. Menschikoff, M.: Monatschr. f. Kinderh. **9**:491, 1910. Stolte, K.: Jahrb. f. Kinderh. **74**:367, 1911; Monatschr. f. Kinderh. **11**:49, 1912. Langstein, Leo, and Meyer, L. F.: Säuglingsernährung und Säuglingsstoffwechsel, Munich, J. F. Bergman, 1914. Ohta, H.: Jahrb. f. Kinderh. **85**:358, 1917. Leichtentritt, B.: ibid. **44**:119, 1921. Dohnal, E.: Monatschr. f. Kinderh. **27**:58, 1923. Hainiss, E.: ibid. **26**:568, 1923. Schiff, E.: Therap. d. Gegenw. **70**:90, 1929. Vogt, H.: Monatschr. f. Kinderh. **31**:30, 1925. Todd, T. W., and Kuenzel, W.: J. Lab. & Clin. Med. **15**:43, 1929. Engel, S.: Deutsche med. Wchnschr. **56**:433, 1930.

During all these years no one paid much attention to the original writing of de Mattos. In 1902, he offered as one of the explanations for the success of buttermilk the fact that the high buffer of cow's milk was satisfied. Like all other observers of the period, he interpreted this in the sense of the importance of free acid for gastric asepsis.

All observers agree that the stools on buttermilk feeding are alkaline.

3. *Conditions Influencing Gastric Digestion.*—These are:

(*A*) The Influence of Infections: In 1891, Wohlmann,[25] stimulated by Epstein of Prague, studied the influence of infection on the secretion of hydrochloric acid. Arguing that cow's milk with its high buffer might confuse his results, he confined his studies mainly to breast-fed infants and found a definite diminution in the secretion of hydrochloric acid during periods of infection. The secretion was always low in premature infants. Fearing the danger lying in the high buffer of cow's milk, he urged that all premature and normal infants suffering from infections be fed human milk. Bauer and Deutsch [26] confirmed these results, and by 1921 Davidsohn,[27] using hydrogen ion technic, reestablished them with increased accuracy.

(*B*) The Optimum Hydrogen Ion Concentration for Gastric Digestion: In this field Allaria [12] was the pioneer. To Davidsohn,[28] however, belongs the credit for developing and establishing knowledge as to the optimum hydrogen ion concentrations for gastric digestion in regard to pepsin, lactase and lipase. But for some reason or other his studies were never closely linked to the foregoing studies on buffer, but seemed lost in a controversy (Salge,[29] Tobler,[30] Rudolph Hess [11] and Huenekens [31]) as to the reliability of analyses of gastric contents obtained by the stomach tube and as to whether there really is an appreciable peptic digestion in the young infant, a question that is still unsettled. Davidsohn also found differences in the gastric acidity of older infants receiving breast milk and cow's milk and likewise showed the hydrogen ion concentration of the gastric contents to be greater on feedings of buttermilk than cow's milk.

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25. Wohlmann, L.: Jahrb. f. Kinderh. **32**:297, 1891.

26. Bauer, L., and Deutsch, E.: Jahrb. f. Kinderh. **48**:22, 1898.

27. Davidsohn, H.: Arch. f. Kinderh. **69**:142 and 239, 1921.

28. Davidsohn, H., and Michaelis, L.: Biochem. Ztschr. **28**:1, 1910; **35**:386, 1911. Davidsohn, H.: Ztschr. f. Kinderh. **2**:420, 1911; **4**:208; **5**:94, 1912; **8**:178; **9**:470, 1913.

29. Salge, B.: Ztschr. f. Kinderh. **4**:171, 1912; **5**:111, 1912.

30. Tobler, L.: Ztschr. f. Kinderh. **5**:85, 1912.

31. Huenekens, E. J.: Ztschr. f. Kinderh. **26**:297, 1914.

4. *The Clinical Success of Acid Whole Milk.*—In 1905, Finkelstein [32] broke away from the prevailing fear of cow's milk fat and, wishing to avoid the low calories of a buttermilk diet, tried a mixture consisting of buttermilk, cream and "Nährzucker." He modestly reported excellent success with this mixture, but questioned whether it was advisable for prolonged feeding—the same question I am asking today. In 1919, Marriott [33] reported successful clinical experiments in athreptic infants with the use of fermented cow's milk, beginning the treatment with equal parts of buttermilk and acid whole milk and then cautiously increasing the carbohydrate. In 1920, still in clinical experimentation,[34] he recommended the cautious use of equal parts of breast milk and lactic acid milk for infantile diarrheas.

In 1922, Marriott, Davidson and Harshman [35] offered in explanation for the success of acid milk feeding that as the high buffer of cow's milk was already satisfied, the mixture permitted a hydrogen ion concentration in the stomach favorable to the activity of the pepsin. Almost simultaneously, Faber and Hadden [36] introduced the same idea, with reference to lipase. Marriott and Davidson, however, elaborated their study by well planned clinical experiment and emphasized sharply the differences between the hydrogen ion concentration in the gastric contents of breast-fed infants and those receiving cow's milk, as well as the influence of parenteral infection.

This is an era of physiology. The higher acidity of the gastric contents of breast-fed infants is interpreted as being of greater importance in furnishing optimum conditions for the activity of gastric ferments than it is for insuring gastric asepsis or aiding mineral metabolism.

Soon Marriott [37] recommended lactic acid milk as a method of routine feeding. The simplicity of the theory led to its ready accep-

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32. Finkelstein (footnote 7, p. 93).

33. Marriott, W. McK.: The Artificial Feeding of Athreptic Infants, J. A. M. A. **73**:1173 (Oct. 18) 1919.

34. Marriott, W. McK.: M. Clin. North America **4**:717, 1920.

35. Marriott, W. McK.; Davidson, L. T., and Harshman, L. P.: Tr. Am. Pediat. Soc. **34**:39, 1922. Marriott, W. McK., and Davidson, L. T.: The Acidity of the Gastric Contents of Infants, Am. J. Dis. Child. **26**:542 (Dec.) 1923.

36. (*a*) Faber, H. K., and Hadden, F.: M. Clin. North America **6**:245, 1922. (*b*) Faber, H. K.: Hydrochloric Acid Milk in Infant Feeding, Am. J. Dis. Child. **26**:401 (Nov.) 1923.

37. Marriott, W. McK.: Preparation of Lactic Acid Milk Mixtures for Infant Feeding, J. A. M. A. **89**:862 (Sept. 10) 1927. Marriott, W. McK., and Davidson, L. T.: Acidified Whole Milk as a Routine Infant Food, ibid. **81**:2007 (Dec. 15) 1923.

tance by the medical profession, and it received the same acclaim [38] as did buttermilk in 1902. A few pediatricians,[39] as Marfan, still prefer buttermilk for acutely ill infants. The innumerable suggestions for its modification, however, testify to the popularity of the mixture. Of special practicability is that of Greenthal,[40] who recommended the addition of lactic acid rather than waiting for bacterial fermentation. Alfred Hess,[41] with his addition of orange juice and lemon juice, was followed by a variety of others.[42] Further reports of success followed.[43]

LACTIC ACID MILK

Considering the extreme importance of the fundamental principles involved, the pediatric world has greeted lactic acid milk with surprising acquiescence. Lactic acid milk brings the first real challenge ever offered to the theories of Czerny and Finkelstein. For more than twenty years scientifically minded pediatricians have accepted the teachings that disturbances arising from feedings of cow's milk are primarily

38. Shaw, Henry: Arch. Pediat. **39**:364, 1922. Sherman, D. H., and Lohnes, H. R.: Tr. Am. Pediat. Soc. **32**:245, 1920. Shaw, H. K., and Williams, F. J.: ibid. **34**:46, 1922. Sherman, DeWitt: Arch. Pediat. **39**:367, 1922. Chapman, J. W.: California & West. Med. **23**:1564, 1925. Mosse, K., and Hoppe, H.: Monatschr. f. Kinderh. **36**:1, 1927. Levine, V. E.: Arch. Pediat. **43**:631, 1926. Kraus, F. J.: J. M. Soc. New Jersey **25**:792, 1928. Chu, Fu T'ang: Nat. M. J. China **14**:219, 1928. Gleich, M.: M. J. & Rec. **130**:153, 1929. Bernheim-Karer, J.: Schweiz. med. Wchnschr. **59**:973, 1929. Blackham, R. J.: J. State Med. **38**:587, 1930. Beumer, H.: Deutsche med. Wchnschr. **56**:44, 1930. Thatcher, L.: Edinburgh M. J. **37**:37, 1930.

39. Marfan, A. B., and Chevalley, M.: Bull. Soc. de pédiat. de Paris **26**:239, 1928. Marfan, A. B.: Rev. gén. de clin. et thérap. **42**:529, 1928. Levinson, S. A.: J. M. Soc. New Jersey **27**:227, 1930. Schiff, E.: Therap. d. Gegenw. **70**: 90, 1929. Saldun (footnote 23).

40. Greenthal, R.: J. Michigan M. Soc. **22**:9, 1923.

41. Hess, A. F., and Matzner, M. J.: The Value of Milk Acidified with Lemon Juice, J. A. M. A. **82**:1604 (May 17) 1924.

42. Faber (footnote 36 *b*). Dunham, B. S.: Acidification of Milk with Vinegar (Acetic Acid) in Infant Feeding, Am. J. Dis. Child. **29**:200 (Feb.) 1925. Weissenberg, H.: Arch. f. Kinderh. **78**:276, 1926.

43. (*a*) Hess, J. H.; Koch, E. M., and Sennewald, Z. C.: Peptic Digestion of Cow's Milk, J. A. M. A. **87**:1360 (Oct. 23) 1926. (*b*) Meyer, Selma: Arch. f. Kinderh. **82**:241, 1927. (*c*) Behrens, R.: ibid. **86**:80, 1929. (*d*) Kochmann, R., and Steinbach, M.: Jahrb. f. Kinderh. **36**:118, 1927. (*e*) Lunz, R. O.: Arch. f. Kinderh. **82**:145, 1927. (*f*) Lash, A. L.: Illinois M. J. **57**:61, 1930. (*g*) Woodward, K. G.: ibid. **57**:210, 1930. (*h*) Gonce, J. E., Jr., and Templeton, H. L.: Citric Acid Milk in Infant Feeding, Am. J. Dis. Child. **39**:265 (Feb.) 1930. (*i*) Niermann, Maria, and Winter, Margot: Arch. f. Kinderh. **89**:290, 1930. (*j*) Barenberg, L. H.; Abramson, Harold, and Messer, W. H.: Five Years' Clinical Experience with Lemon Juice-Milk, Am. J. Dis. Child. **39**:948 (May) 1930.

metabolic, Czerny orginating the idea in the study of constipated babies (*Milchnährschaden*) and Finkelstein elaborating the conception to include diarrheal disease (alimentary intoxication). To Finkelstein the severe diarrheas of infancy (excluding, of course, an acute indigestion or a specific bacterial infection) are due to a primary injury to the general body nutrition by improper combinations of cow's milk followed by secondary digestive failure and diarrhea.

The generalization underlying the theory of lactic acid milk is essentially the reverse of the foregoing. By recognizing the necessity of carbohydrate addition, it tacitly admits a certain metabolic injury by cow's milk. This is not an active injury, but merely one of deficiency. It presumes that if the deficiency is corrected by sufficient carbohydrate and if enough acid is added to the mixture to facilitate peptic digestion, no injury to the general body nutrition will follow.

Surprisingly few studies have been made on the effect of lactic acid milk feeding on the general body metabolism, and even these are limited almost entirely to the effect of the acid added.[44] In respect to these studies on metabolism, there seems to be an important defect. Years ago Finkelstein taught that the condition *"Milchnährschaden"* was not an injury by fat but a reaction to insufficient carbohydrate. In all fedings of whole cow's milk or lactic acid milk, the addition of carbohydrate is necessary; otherwise, nutritional disturbance follows. The effect on metabolism of whole lactic acid milk without carbohydrate is that of an unphysiologic food. Metabolic studies must be made on lactic acid milk plus carbohydrate; in other words, on the metabolism of overfeeding.

Fasold[45] reported that the addition of 4 Gm. of sodium chloride to the daily diet of breast-fed infants had no effect on the urine, while it caused an increased elimination of ammonium bicarbonate in infants fed lactic acid milk. Thoenes[46] investigated the effect of acid milk feeding on the tissue composition of animals, but his results are inconclusive.

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44. von Bermuth, E., and Dicker, J.: Arch. f. Kinderh. **80**:21, 1926. Brahdy, M. B.: Lactose Metabolism in Infants: Its Relation to Lactic Acid Milk, Am. J. Dis. Child. **33**:451 (March) 1927. Blatherwick, M. R., and Long, M. L.: J. Biol. Chem. **53**:103, 1922. Greene, David: Effect on the Urine of Addition of Acids and Alkalis to the Diet of Infants, Am. J. Dis. Child. **35**:38 (Jan.) 1928. Darrow, D. C.: The Carbon Dioxide Absorption Curve of Infants Fed Lactic Acid, Hydrochloric Acid and Boiled Cow's Milk, ibid. **40**:1016 (Nov.) 1930. Niermann and Winter.[431]

45. Fasold, H.: Monatschr. f. Kinderh. **51**:384, 1932.

46. Thoenes, F.: Jahrb. f. Kinderh. **128**:155, 1930.

In 1930, I [47] raised the question of whether the use of lactic acid milk plus carbohydrate was not subjecting the babies to overfeeding. In the earlier days of pediatrics, failures with cow's milk were mostly ascribed to its indigestibility, the index being the stool. Cow's milk was then diluted, and the stool improved, but disaster often followed from the ensuing inanition. The demands of the body had been neglected. In 1917, under the influence of European teachings, I [48] urged that altogether too much emphasis was placed on stool examination and not enough consideration given to body requirements. "The body is more important than the stool." Brennemann [49] recently expressed the same idea cleverly, "The stool is the index of digestion, not nutrition."

In recent work [50] we have shown that if sufficient lactose is added to whole cow's milk to establish a lactose-protein ratio like that in breast milk, the resulting stools resemble in some respects those of breast-fed infants. But in spite of normal-appearing stools, after several months on such a diet, some of the children reacted with severe nutritional disturbance. Was this now a tissue injury effected by overfeeding rather than the old injury of inanition? Alimentary intoxication may develop with normal stools. The serious results of an epidemic of otitis and mastoiditis reported by other observers some years ago in children who had received the usual lactic acid milk mixtures led me to ask whether the overfeeding almost necessitated by this combination may not have diminished the resistance and exaggerated the reaction of the body to infection.

Are we accepting the feedings of whole cow's milk too readily? Are we repeating the mistakes of our predecessors? Are we following the index of the stool too closely and neglecting the requirements of the body—only in this case the normal stools and rapid gain in weight being concomitant with overfeeding rather than inanition?

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47. Gerstley, J. R.: Studies in Infant Nutrition: VI. Lactose and a Maltose-Dextrin Preparation, J. A. M. A. **95**:1233 (Oct. 25) 1930.

48. Hill, L. W., and Gerstley, J. R.: Clinical Lectures on Infant Feeding, Philadelphia, W. B. Saunders Company, 1917.

49. Brennemann, J.: The Curd and the Buffer in Infant Feeding, J. A. M. A. **92**:364 (Feb. 2) 1929.

50. Gerstley, J. R.; Wang, Chi Che, and Wood, A. A.: The Influence of Feeding on Certain Acids in the Feces of Infants: III. A Comparison of the Effects of Breast Milk and of Whole Cow's Milk on the Excretion of Volatile Acids and of Lactic Acids, Am. J. Dis. Child. **39**:487 (March) 1930; IV. The Effect of an Excess of Lactose in Breast Milk and in Whole Cow's Milk on the Exacerbation of Volatile Acids and of Lactic Acids, ibid. **39**:729 (April) 1930. Gerstley, J. R.: The Influence of Feeding on Certain Acids in the Feces of Infants: V. Clinical Considerations, ibid. **40**:27 (July) 1930.

Such questions are easy to ask but hard to answer. Painstaking studies will be required for their solution. It is on account of fear of overfeeding that I still adhere to dilutions of milk.

Most of the studies on acid milk feeding have not been on body metabolism but on gastric digestion and the stool. Brennemann,[49] in an interesting study, attacked the buffer theory and offered excellent clinical evidence that the perfect stool on lactic acid milk feeding is due not to the saturated buffer, but to the fine curd induced by the addition of acid. His work finds corroboration in that of Holm and Webb, Marfan and others.[51]

While not undertaken from the point of view of infant nutrition, newer studies in physiology also cast grave doubt on the theory of the buffer in gastric digestion. These studies have suggested that pepsin requires a p_H of from 1 to 2 for its activity and a hydrogen ion concentration far higher than that reported by Marriott in the gastric contents of nurslings. Perhaps the old controversy (Davidsohn and others [52]) will be reopened as to whether there really is peptic digestion in early infancy. Again these results suggest that perhaps Faber [30] was right, and the benefit of the addition of acid is to the lipase.

One is almost tempted to reconsider the somewhat neglected hypothesis that the increased acidity of the gastric contents in lactic acid milk feeding in addition to the high protein diet stimulates an increased outpouring of the intestinal juices. Perhaps these, in addition to the fine casein curd, are responsible for the improved digestion. Whether an excessive outpouring of these juices drains the body of alkalis is another matter.

As regards the stool, Margaret Upton [53] has shown that smears and cultures of the feces in lactic acid milk feeding are typical of a cow's milk rather than of a breast milk diet. Gerstley, Howell and Nagel [54] confirmed these results and showed that it was necessary to add as much lactose to lactic acid milk as to cow's milk to change the gram-negative flora to the gram-positive flora typical of breast-fed infants. In both mixtures the addition of lactose did not maintain the flora as constantly gram-positive as in breast-fed infants.

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51. Schiff, E., and Mosse, K.: Saure Milchmischungen in der Ernährungstherapie des Säuglings, Berlin, S. Karger, 1924. Muller, Fritz: Ztschr. f. Kinderh. **38**:705, 1924. Moll, L.: Arch. f. Kinderh. **42**:327, 1905. Holm, G. E., and Webb, B. H.: Buffer Capacities of Various Milks and Proprietary Infant Foods, Am. J. Dis. Child. **40**:260 (Aug.) 1930. Marfan, A. B.: Nourrisson **18**:137, 1930.

52. Davidsohn (footnote 28). Salge (footnote 29). Tobler (footnote 30). Huenekens (footnote 31).

53. Upton, M. F.: The Anaerobic Intestinal Flora of Normal Breast-Fed and Artificially Fed Infants, Am. J. Dis. Child. **37**:1221 (June) 1929.

54. Gerstley, J. R.; Howell, K. M., and Nagel, B. R.: Some Factors Influencing the Fecal Flora of Infants, Am. J. Dis. Child. **43**:555 (March) 1932.

PURPOSE OF THIS STUDY

It must be clear that I believe that the final verdict on feedings of whole lactic acid milk plus carbohyrate must wait until the effect on the body is better understood. In the meantime there remains the opportunity for simpler studies. Now that the effect of this feeding on the fecal flora is known, one should, at any rate, know some of its effects on the chemical composition of the stool.

This study is a comparison of the effects of lactic acid milk, cow's milk and breast milk with and without the addition of carbohydrate on certain end-products of carbohydrate metabolism.

In regard to the stools of infants on lactic acid milk feedings:

1. Does the addition of lactic acid to cow's milk, by aiding its gastric digestion, affect the carbohydrate end-products in the stool?

2. If at least 12 per cent lactose is required in whole cow's milk to furnish enough acid by intestinal fermentation to overcome its alkalinizing property and make the stool resemble to some extent, bacteriologically and chemically, that of the breast-fed infant, would it be necessary to add the same amount to lactic acid milk?

3. Does the added lactic acid appear in the stool?

RESULTS

The chemical findings in the stools of the six babies recently studied [54] bacteriologically now form the basis of a more detailed report. Determinations were made on total titratable, total free and bound volatile and free and bound lactic acids, as well as the hydrogen ion concentration.

The accompanying table shows the individual analyses of the twenty-four hour specimens. The chart showing the average of all of them will facilitate reading. While there is considerable variation in the individual determinations, the average unquestionably shows the general trend.

It will be noted that the stools of breast-fed infants contain a definite quantity of titratable acids and a somewhat larger amount of total free and bound volatile acids. Lactic acid is present in approximately the same amount as titratable acid. As in our other observations,[50] the hydrogen ion concentration is high.

The addition of 12 per cent lactose to breast milk, as in our previous reports, causes little change. Apparently breast milk is a medium so ideally adapted to the activity of digestive ferments that the lactose added to it is all digested and absorbed. The observations on whole cow's milk with 3 and 12 per cent lactose are much the same as those we have already reported. On feedings of undiluted cow's milk, there

Determinations of Total Titratable, Total Free and Bound Volatile and Total Free and Bound Lactic Acids and Hydrogen Ion Concentration on Twenty-Four Hour Stool Specimens

Diet	Number of Stools	Total Weight	Total Titratable Acid	Total Volatile Acid	Lactic Acid	p_H
			Baby I			
Breast milk	3	52.3	42.3	79.1	26.5	3.07
	2	51.5	21.4	75.8	35.5	3.17
	2	65.2	44.3	124.9	77.5	3.42
Breast milk plus lactose	3	47.4	19.1	59.7	21.0	4.63
	2	28.8	23.1	48.4	26.1	5.61
	1	26.4	43.8	117.4	50.2	4.42
Whole cow's milk	3	105.3	20.4	140.2	11.6	7.15
	4	170.4	5.8	260.0	7.0	7.0
	4	49.6	3.5	77.4	6.5	....
	4	66.0	5.0	81.6	6.1	7.39
	2	36.3	— 8.0*	37.1	2.5	8.80
Whole cow's milk plus 3% lactose	2	46.1	1.3	20.8	3.9	8.0
	2	68.4	2.1	38.5	10.5	8.0
Whole cow's milk plus 12% lactose	3	85.2	46.2	99.1	49.6	6.6
	3	73.6	44.9	199.3	41.4	6.0
	2	65.9	68.6	121.0	....	5.4
	1	23.5	6.6	85.8	5.4	6.9
Whole lactic acid milk	1	11.3	21.8	21.4	1.4	8.4
	2	50.0	—13.2*	232.6	4.7	8.6
			Baby II			
Breast milk	3	11.9	7.2	23.6	11.4	5.26
	4	108.6	21.8	98.9	29.1	5.59
	4	16.3	10.8	30.3	15.6	5.22
	2	46.0	23.5	36.4	18.3	5.17
Whole lactic acid milk	3	70.8	18.3	171.1	12.8	6.98
	3	47.5	—13.3*	112.1	5.9	8.6
Whole cow's milk	3	40.6	—20.3*	48.2	3.14	8.6
	4	33.2	0.50	32.6	3.2	7.31
	3	52.8	—18.7*	27.3	4.8	8.4
	2	65.5	2.02	57.4	4.7	7.5
Whole cow's milk plus 3% lactose	2	35.6	5.7	34.2	3.8	7.3
	3	60.4	3.0	70.1	8.6	8.0
	3	76.9	11.3	46.8	14.6	7.2
Whole cow's milk plus 12% lactose	2	23.9	6.7	46.1	6.5	6.7
	4	119.7	28.8	117.0	33.5	5.4
			Baby III			
Breast milk	1	48.5	11.3	34.1	12.7	5.8
	2	87.0	81.1	25.9	43.1	4.4
	1	14.5	3.9	36.8	5.7	7.3
	2	16.1	28.0	93.4	3.2	5.2
Breast milk plus 12% lactose	2	39.4	44.3	86.1	3.0	5.0
	2	35.4	24.0	68.7	40.5	4.6
Whole lactic acid milk	2	87.8	1.11	46.5	4.02	8.0
	2	40.0	—18.4*	75.4	3.1	8.4
	2	44.3	—11.3*	43.5	3.1	8.4
	3	78.5	—33.0*	49.6	5.3	8.6
	1	43.1	— 9.1*	46.2	3.1	8.4
	4	72.2	—22.5*	101.8	5.9	8.4
	1	35.0	—29.3*	31.8	1.5	8.4
	1	57.0	—21.7*	28.3	1.7	8.4
	3	31.0	—27.0*	30.7	13.9	8.5
Whole lactic acid milk + 3% lactose	1	16.8	—10.9*	21.0	3.32	8.4
	2	60.1	—15.7*	47.8	6.12	8.4
	3	31.3	— 8.8*	49.9	4.15	8.4
	1	45.3	— 8.8*	38.5	4.43	8.2
	3	52.5	— 9.9*	80.6	4.73	8.2
	1	28.0	—12.3*	28.6	3.28	8.6
Whole lactic acid milk plus 12% maltose-dextrine	2	35.3	—10.7*	35.1	28.8	8.2
	2	58.0	—13.4*	66.4	43.2	8.2
	2	46.2	—19.3*	75.8	16.6	8.0
Whole lactic acid milk plus 12% lactose	1	33.0	— 4.98*	52.0	2.30	8.0
	3	89.1	29.9	202.4	29.9	7.1
	2	80.0	33.8	130.2	26.8	6.9
	2	80.4	14.1	130.7	11.8	6.7
	3	82.0	13.0	116.8	32.8	6.7
Whole cow's milk	3	89.0	— 8.25*	40.6	2.59	8.6
	2	60.0	—25.7*	54.3	7.17	8.4
	2	12.0	—12.5*	20.3	1.91	8.2
	3	37.0	—12.19*	38.5	2.61	8.6

* Alkaline.

Determinations of Total Titratable, Total Free and Bound Volatile and Total Free and Bound Lactic Acids and Hydrogen Ion Concentration on Twenty-Four Hour Stool Specimens.—Continued

Diet	Number of Stools	Total Weight	Total Titratable Acid	Total Volatile Acid	Lactic Acid	p_H
		Baby IV				
Breast milk	1	16.6	3.8	5.7	3.2	6.2
	3	51.7	23.3	40.9	21.3	5.4
	1	34.0	14.5	34.9	9.5	5.4
	1	18.8	15.1	30.3	4.8	5.4
	2	19.3	5.6	37.6	13.2	5.4
Breast milk plus 12% lactose	1	37.3	22.5	43.6	16.1	5.4
	1	7.5	2.8	23.2	3.9	5.4
	1	13.5	19.0	41.1	10.9	5.8
Whole cow's milk	3	81.3	5.7	83.0	6.5	8.6
	3	48.1	1.5	87.5	3.9	8.2
	4	72.2	—6.9*	103.0	3.4	8.2
	3	43.5	—4.0*	64.2	2.7	8.2
	3	67.4	17.0	133.9	24.0	7.3
	3	96.1	61.4	138.4	58.9	5.8
	3	176.4	80.1	194.0	146.1	5.8
Whole lactic acid milk plus 3% lactose	2	21.9	—11.7*	45.3	1.4	8.2
	2	32.2	0.81	53.9	1.2	8.4
Whole lactic acid milk plus 12% lactose	3	80.5	7.05	149.6	6.7	7.1
	2	67.4	8.3	149.1	6.4	7.5
	2	55.6	—8.1*	129.4	6.7	8.2
Whole lactic acid milk	2	71.4	5.5	60.9	10.5	7.4
	1	57.2	—10.9*	92.8	13.0	8.2
	2	66.1	— 7.6*	50.9	4.1	8.2
Whole lactic acid milk plus 3% lactose	2	69.5	—16.7*	91.6	7.5	8.0
	2	16.5	— 4.0*	23.7	2.3	8.4
	2	50.0	14.8	72.0	7.3	7.4
Whole lactic acid milk plus 12% lactose	2	99.5	7.1	75.0	17.1	7.4
	2	82.0	68.6	89.8	34.4	5.8

* Alkaline.

are a low titratable acidity, a greater volatile acidity than in breast-fed infants and less lactic acid. The alkalinizing effect of cow's milk on the intestine in spite of the increased total volatile acidity is shown by the low hydrogen ion concentration.

The addition of 3 per cent lactose to cow's milk increases the titratable acid, the total volatile acidity in this case, and the lactic acid. The hydrogen ion concentration is also increased.

In this set of experiments, the addition of 12 per cent lactose to whole cow's milk does not show the striking increase in hydrogen ion concentration reported in previous work.[55]

The experiments with lactic acid milk are interesting in showing that this mixture has an even greater alkalinizing effect on the intestine than cow's milk.

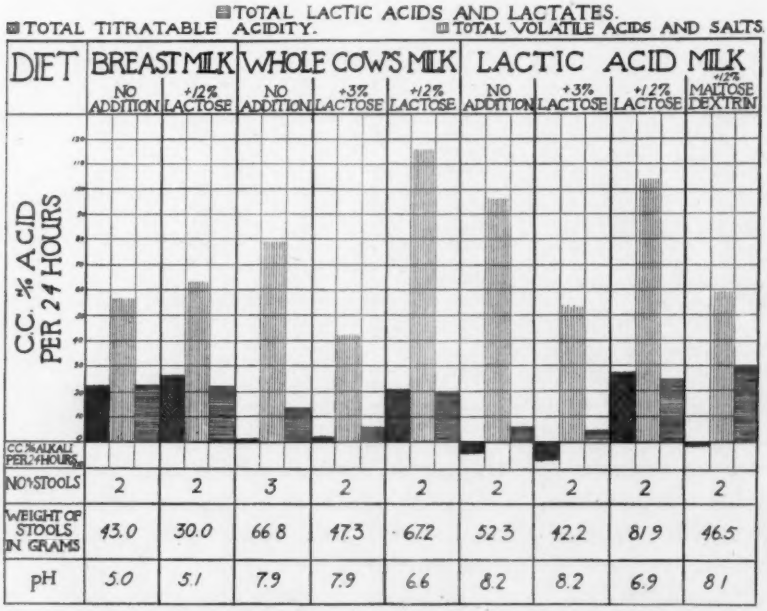
In feedings of whole lactic acid milk it will be seen that there is no free acid, the titration showing alkali; this is so in spite of a considerable total volatile acidity. The lactic acid is lower than in breast milk feedings, the average being even lower than on cow's milk. The hydrogen ion concentration ranges definitely to the alkaline.

55. Gerstley (footnotes 47 and 50).

The addition of 3 per cent lactose, as in cow's milk, causes little change.

The addition of 12 per cent lactose effects about the same changes as in cow's milk, resulting in an increase of titratable acid, a greater total volatile acidity, increased lactic acid and an increased hydrogen ion concentration.

In a study previously reported,[47] I noted that the addition of 12 per cent of a maltose-dextrin preparation to cow's milk had little effect on the titratable acids and the hydrogen ion concentration of the stool. In this study the same amount of this preparation added to lactic milk


TOTAL LACTIC ACIDS AND LACTATES.
TOTAL TITRATABLE ACIDITY.
TOTAL VOLATILE ACIDS AND SALTS
CC. % ACID PER 24 HOURS
CC. % ALKALI PER 24 HOURS

DIET	BREAST MILK		WHOLE COW'S MILK			LACTIC ACID MILK			
	NO ADDITION	+12% LACTOSE	NO ADDITION	+3% LACTOSE	+12% LACTOSE	NO ADDITION	+3% LACTOSE	+12% LACTOSE	+12% MALTOSE DEXTRIN
NO. STOOLS	2	2	3	2	2	2	2	2	2
WEIGHT OF STOOLS IN GRAMS	43.0	30.0	66 8	47.3	67.2	52 3	42.2	81 9	46.5
pH	5.0	5.1	7.9	7.9	6.6	8.2	8.2	6.9	8 1

The average of all the determinations of total titratable, total free and bound volatile and total free and bound lactic acids and hydrogen ion concentration on the twenty-four hour stool specimens.

resulted in findings in the stool resembling those reported in whole cow's milk feeding with the exception of the lactic acid determinations. In this series the lactic acid seems to run a little higher.

It will be noted that the number of stools is approximately the same in each of the determinations reported, so that changes in speed of peristalsis plays no part in these readings (Scheer and Muller [56]).

Clinical observations on these babies were of little import, the material being too limited. The absence of any severe parenteral infec-

56. Scheer, K., and Muller, F.: Jahrb. f. Kinderh. **51**:143, 1923.

tion prevented any contrast between the babies fed whole cow's milk and those fed lactic acid milk.

Routine urinalysis showed that the babies fed whole cow's milk and whole lactic acid milk, with or without the addition of carbohydrate, are somewhat less stable than those fed breast milk. While albumin, casts and sugar were infrequent, when noted they were invariably found in the urine of babies fed whole cow's milk or lactic acid milk, though in all of these the abnormalities were transitory.

COMMENT

What is the significance of these findings? They may be discussed from two points of view:

The Gastro-Intestinal Tract.—1. There can be no question as to the lowered hydrogen ion concentration and diminished free acid in the stool following feedings of lactic acid milk. Newer studies in physiology [57] show that the digestion of breast milk requires only a small quantity of gastric juice and a correspondingly small quantity of the various intestinal juices. The small quantity of acid needed in the stomach finds reflection in the small quantity of the alkaline intestinal juices required to reduce this acidity. With cow's milk the relatively large quantity of gastric juice required seems to call forth an additional secretion of the intestinal secretions. In addition, cow's milk exerts an alkaline as well as an acid buffer. If I interpret the findings correctly, the addition of lactic acid to cow's milk, while lightening the load on the stomach, has no such effect on the intestine. Indeed, the actual alkalinity of the stool suggests that the addition of acid may possibly excite an even greater outpouring of the intestinal secretions.

2. There can be no question that the amount of lactic acid in the stool on lactic acid milk feedings is decidedly less than in feedings of breast milk or feedings of cow's milk or lactic acid milk, with excess of lactose. The addition of lactic acid to cow's milk can exert little effect on the intestine or on body metabolism unless one presumes that lactic acid given by mouth is more effective than the larger amounts formed by bacterial fermentation farther along the intestine.

3. Presumably the acid base balance of the stool depends on the proportions and quantities of protein, carbohydrate and mineral in the diet as well as on the quantities of digestive secretions and the products of bacterial metabolism. The addition of lactic acid to cow's milk has no

57. Freudenberg, E., and Stern, F.: Jahrb. f. Kinderh. **56**:109, 1924. Gyorgy, P.: Arch. f. Kinderh. **72**:1, 1923. Schiff, E., and Gottstein, W.: Jahrb. f. Kinderh. **57**:99, 1925. Budde, quoted by Freudenberg, Ernest: Physiologie und Pathologie der Verdauung im Säuglingsalter, Berlin, Julius Springer, 1929.

decided effect on this balance. Certainly studies should be made as to the effect of this feeding on the digestion and excretion of fat (Faber [36]).

General Body Metabolism.—1. If the foregoing interpretations are correct, lactic acid milk does not ease the load on the intestine, but requires an increased outpouring of digestive juices. What effect has this on the body? Is there an eventual drainage of alkali from the tissues? Are we tending to a modernized *"Milchnährschaden,"* or to the development of rickets?

2. The question as to whether the addition of lactic acid has any effect on body metabolism is inconsequential, as I attempted to point out in the review of the literature. Such studies must be made on milk plus carbohydrate. The students of metabolism have also overlooked the fact that lactic acid is added to cow's milk only to facilitate gastric digestion.

3. Is there a ratio of carbohydrate to protein optimum for the body cells of the growing infant? The four to one ratio in breast milk must have some significance. It cannot be overlooked that men using high protein diets [58]—Bessau with whole milk and cereal, Marriott with lactic acid milk and karo, Brennemann with evaporated milk, Finkelstein and Meyer with albumin milk [59] and others empirically—used from 9 to 10 per cent carbohydrate. The feedings, the carbohydrates and, unquestionably, the stools were different; however, many observers at first used a ratio of carbohydrate to protein somewhat approximating that in breast milk. We [50] have found this ratio to give favorable chemical reactions in the stool. Is this the ideal relationship for the metabolism of the growing body? Proper nutrition requires a certain proportion of carbohydrate to fat. Do the body cells of the growing infant demand an optimum ratio of carbohydrate to protein?

Fear of overfeeding soon led to a reduction of the carbohydrate to amounts covering the minimum body requirements. It is interesting to reflect that even with these lower carbohydrate diets, if one assumes that all infants have the capacity of changing over 50 per cent protein to carbohydrate, the carbohydrate-protein ratio in the tissues remains roughly four to one as in breast milk. In the case of breast milk, the proportion

58. Bessau, G.: Monatschr. f. Kinderh. **42**:28, 1929. Schoedel, J.: ibid. **49**: 17, 1931. Brennemann.[49] Weinfeld, G. F., and Floore, F. B.: Infant Feeding: With Unlimited Amounts of a Concentrated and a Dilute Cow's Milk Formula, Am. J. Dis. Child. **40**:1208 (Dec.) 1930. Wright, H. P.; Geddes, A. K., and Vick, C. L.: A Comparison of the Results Obtained in the Feeding of Infants According to Appetite on Sweet and Lactic Acid Milk Formula, ibid. **40**:927 (Oct.) 1930.

59. They frequently found it necessary to add 9 per cent carbohydrate to albumin milk to cause the infants to gain weight.

exists in the food. In the case of high protein, relatively low carbohydrate foods, the possibility exists that the tissue cells are creating the same relationship.

In other words, breast milk seems a food ideally adapted to gastric digestion, to intestinal digestion and to the body needs. If I am correct in my interpretation, the addition of lactic acid to cow's milk lightens the burden on the stomach but probably does not relieve the intestine or the body cells from the burden of a whole cow's milk diet.

4. These thoughts reopen the subject of stool analyses. With the present conception of the primary importance of body nutrition, breast milk is regarded as a food designed primarily for the body cells and leaving a typical residue in the intestine. This residue must then be considered the index of a perfect food for the growing tissue cells. Should an artificial feeding on which a baby thrives contain such relationships as to leave a similar residue, or are the relationships in the diet of no importance, and should the entire responsibility be left to the body cells?

5. The question of overfeeding in relation to the resistance and reaction of the body to infection has already been discussed.

SUMMARY AND CONCLUSIONS

1. Six babies were given feedings of breast milk, breast milk plus 12 per cent lactose, whole cow's milk, whole cow's milk with 3 per cent and later 12 per cent lactose, lactic acid milk, lactic acid milk with 3 and 12 per cent lactose and 12 per cent of a maltose-dextrin preparation.

2. Determinations of total titratable acids, total volatile acids (free and bound), total lactic acid (free and bound) and hydrogen ion concentration were made on the twenty-four hour stool specimens.

3. In the determinations made, the stools of infants fed lactic acid milk resembled those of infants fed whole cow's milk and not those of infants fed breast milk.

4. It was necessary to add the same amount of lactose to whole lactic acid milk (12 per cent) as to whole cow's milk to overcome its alkalinizing effect on the stool.

5. The addition of 12 per cent of a maltose-dextrin preparation to lactic acid milk gave no different results than when added to whole cow's milk.

6. The urine of the babies fed whole cow's milk or whole lactic acid milk showed traces of albumin, casts and sugar more frequently than that of breast-fed infants, but these changes were transitory.

7. In discussing the results from the point of view of the gastrointestinal tract, the analyses suggest that:

(*a*) The digestion of whole lactic acid milk demands as much of the intestinal digestive juices as does whole cow's milk, or more.

(*b*) The addition of lactic acid to whole cow's milk does not increase the amount of lactic acid in the intestine nearly as much as does the addition of lactose.

(*c*) The question is reopened as to whether the benefit of the addition of acid may not be to the lipase.

8. In interpreting these results from the standpoint of general metabolism, the following questions are raised:

(*a*) Are not the studies on lactic acid milk without the addition of carbohydrate those of an unphysiologic food? Lactic acid milk feeding requires the addition of carbohydrate. Metabolic studies must take into consideration the question of overfeeding.

(*b*) Does the increased amount of intestinal juice required by diets of whole cow's milk tend to deplete the body of minerals?

(*c*) Is there an optimum ratio of carbohydrate to protein which preferably should be offered in the food?

(*d*) Can one attach a newer significance to stool examination?

(*e*) How does overfeeding effect the composition of the tissues and their reaction and immunity to infection?

To summarize, there are in whole lactic acid milk:

(*a*) A food that apparently is as easy of gastric digestion as breast milk, but which does not alter the effects of a diet of whole cow's milk on the intestine and may not on the body.

(*b*) A food that usually leads to overfeeding.

(*c*) A method of feeding which brings direct challenge to the theories of metabolic injury so beneficial to the development of pediatrics during the last twenty years.

These studies were made possible by the cooperation of Dr. Herman Smith, Superintendent, Miss Dora Saunby, Head of the Training School of Michael Reese Hospital, Misses Elizabeth Terrill, Gladys Benz and Evelyn Lundeen, Supervisors in Sarah Morris Hospital, and Misses Elizabeth McConnell, Aletta Horn, Rae Bennett and Georgia Ball of the Social Service Department.

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RENAL TUBERCULOSIS IN JUVENILES

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Although renal tuberculosis is not common in children except as part of a generalized infection, the incidence of the lesion as manifested by so-called chronic pyelitis is sufficiently high to merit serious consideration. Four personal cases of surgical renal tuberculosis in children (3, 7, 8 and 11 years of age, respectively) who were treated by nephrectomy and a bilateral nonsurgical case (at 7 years) are here reported, together with one of calcified renal tuberculosis in a boy of 17 years. In the latter case, the urinary tuberculous history dated from the age of 3 years. These cases emphasize by specific illustration the great importance of complete urologic investigation when symptoms of disturbances of the urinary tract exist in the young. All of the patients were examined because of persistent pyuria; in 2 (cases 2 and 6), urinary frequency with incontinence had led to the diagnosis of enuresis. In case 5, extreme frequency was the outstanding symptom. Early recognition of unilateral renal tuberculosis with prompt nephrectomy usually may be expected to result in cure; with delay, bilateral involvement and a fatal outcome may be anticipated.

The incidence of surgical renal tuberculosis, as differentiated from the acute miliary form, rapidly increases as the age of 15 and over is reached. In a series of 2,420 pediatric autopsies at Bellevue Hospital, but 4 cases of surgical renal tuberculosis were found. I am concerned here only with the surgical variety. In a study of 312 infants and children with chronic pyuria, the 5 juvenile cases (cases 1 to 5) reported here were found. This suggests that renal tuberculosis exists in 1 in from 60 to 75 cases of so-called chronic pyelitis.

No age is exempt. Stevens reported nephrectomy for tuberculosis in an infant of 13 months,[1] the diagnosis having been made by cystoscopy. Bardenhauer (quoted by Beer and Hyman[2]) is said to have removed a tuberculous kidney from a child of 3 months. In 47 cases

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From the Departments of Children's Medicine, Surgery and Urology, Bellevue Hospital.

1. Stevens, W. E.: Diagnosis of Tuberculosis, J. A. M. A. **88**:71 (Jan. 8) 1927.

2. Beer, E., and Hyman, A.: Diseases of the Urinary Tract in Children, New York, Paul B. Hoeber, Inc., 1929, p. 229.

collected by Vignard and Thévenot,[3] the age distribution was as follows: under 3 years, 4 cases; from 3 to 6 years, 8 cases; from 6 to 11 years, 9 cases, and from 11 to 16 years, 17 cases.

The ratio of the male to female incidence is 3:2; the ratio of involvement of the right and left sides is 5:4. It seems likely that the same factors which operate to cause a higher incidence of right-sided nontuberculous renal infections operate in tuberculosis.

Active tuberculosis elsewhere is the chief predisposing factor to renal tuberculosis. Because of a diminished or a total lack of resistance in the young, the renal and other tuberculous processes most often assume the acute miliary form; caseation and other localizing processes indicate a certain degree of resistance.

ETIOLOGY

Renal tuberculosis is always secondary to tuberculosis elsewhere. In children, the initial focus is most often in the lungs, lymph nodes or intestinal tract. Coexistent skeletal lesions are often secondary to the same focus as the renal disease. Current opinion holds that the renal invasion is hematogenous in most instances. Some investigators [4] believe that the disease is confined to one organ from the beginning; others,[5] that the initial disease is bilateral but develops in only one kidney. In from 12 [4] to 57 per cent [6] of cases in adults, the disease can be urologically demonstrated to be bilateral.

In the development of the tuberculous process, a mixed infection frequently exists. Colon bacilli are most often found; these seem to withstand the bacteriostatic effects of tuberculotoxin better than other organisms. On the other hand, culture may be sterile. Parenthetically, a sterile pyuria is most likely to be tuberculous.

PATHOLOGY

Surgical renal tuberculosis is most often of the caseocavernous variety, but may be pyonephrotic, nodular or sclerotic. In speaking of chronic renal tuberculosis, the caseocavernous type is usually meant; pyonephrosis is but an advanced form of the caseocavernous lesion. The nodular and sclerotic varieties are evidence of an unusual local resistance to the infection.

There is still a wide divergence of opinion concerning the initial site of tuberculous infection. Some workers believe that it is at the

3. Vignard, P., and Thévenot, L.: La tuberculose rénale chez l'enfant, J. d'urol. **1**:323, 1912.

4. Wildbolz, Hans: Chirurgie der Nierentuberkulose, Stuttgart, Ferdinand Enke, 1913.

5. Medlar, E. M.: Am. J. Path. **2**:401, 1926.

6. Thomas, G. J.: Renal Tuberculosis, J. A. M. A. **94**:229 (Jan. 25) 1930.

papillary niche;[7] others, in the corticomedullary zone,[8] and still others in the cortex. At any rate, the infection becomes widespread throughout the kidney, chiefly through the lymphatics, with the development of numerous tuberculous lesions, the character of which depends chiefly on local resistance. With much resistance, the sclerotic or nodular variety of lesions forms; with less resistance, the caseocavernous type is formed. Three of our cases (cases 1, 3 and 4; figs. 2 and 4) were of the latter variety; 1 (case 2) was of the sclerotic type.[9] In rare instances, calcification of the necrotic débris within the tuberculous kidney results and roentgenologically may suggest stone (case 5, fig. 6).

The kidney of chronic tuberculosis is surrounded by fibrolipomatosis. As in case 4, the kidney may become densely matted to the underlying structures, especially the psoas muscle. The ureter becomes thickened, scarred, strictured and surrounded by contracting fatty scar. These obstructing lesions lead to hydronephrosis and pyonephrosis, often with pelvic stone formation. In some instances, autonephrectomy (sealing off of the ureter with excommunication of the tuberculous kidney) occurs. Ureteral contracture leads to trigonal distortion; sometimes the orifice appears high in the posterior wall of the bladder.

Nephritic changes in the good kidney and in the uninvolved portion of the tuberculous organ are due to tuberculotoxin and are manifested by albuminuria, casts and, sometimes, red blood cells, but they usually disappear with removal of the diseased kidney.

The changes in the bladder are those of congestion, edema, ulceration, necrosis and sclerosis, dependent on the intensity and duration of the disease and the repair process. Ulceration may be replaced by granulation tissue. These changes are of great importance in the cystoscopic diagnosis of renal tuberculosis, and while their visualization is not absolutely pathognomonic, they are characteristic. In early renal tuberculosis, the cystoscopic picture is often normal. In case 5, the ureteral orifices could not be found.

In the initial clinical stages of the disease, only one kidney is involved. Involvement of the second kidney may be hematogenous or, perhaps more frequently, ascending (urogenous) through the ureterovesical orifice, which is diseased and rendered incompetent by vesical tuberculosis. This phenomenon indicates the urgency of early recognition of renal tuberculosis and treatment by nephrectomy. No case of proved spontaneous cure of renal tuberculosis has ever been reported; most apparent cures result from autonephrectomy.

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7. Wildbolz, H.: Renal Tuberculosis, J. Urol. **21**:145, 1929

8. Walters, W.: Minnesota Med. **6**:307, 1923.

9. In case 5, a nonoperative case, the pathologic type remains unknown; urography suggested a caseo-hydronephrotic lesion.

SYMPTOMS

In three fourths of the patients with chronic renal tuberculosis, disturbance of urination—frequency, dysuria, urgency, burning, tenesmus and so forth—is the initial and outstanding symptom. When this symptom exists, the diagnosis is usually acute cystitis; local treatment is thoroughly ineffectual. Marked frequency with incontinence may appear; in 2 of our patients (cases 2 and 6), enuresis had been diagnosed. Pyuria always exists, is usually macroscopic, but may be microscopic, and commonly causes a diagnosis of chronic pyelitis to be made. Pain in the loin, along the ureteral course or over the bladder, may be sharp, dull, aching, intermittent or constant. Often pain is absent. An initial brisk painless hematuria may herald the disease; microscopic blood is found at some time or other in all cases. The passage of clots or débris may produce colic. Seldom is renal enlargement noted; sometimes the palpable mass is chiefly a perirenal fibrolipomatosis. Occasionally a hydronephrotic or a pyonephrotic organ is felt.

Secondary involvement of the psoas muscle may cause disease of the hip joint or spinal tuberculosis to be diagnosed; this error is common in children. However, in case 4, a large renal abscess was buried in the psoas muscle without orthopedic manifestation.

Systemic symptoms are those of tuberculotoxemia or, with advanced bilateral renal disease, uremia. Fever is usually continuous, and low grade, but may be hectic or intermittent dependent on the activity of the infection and on the adequacy of urinary drainage. Particularly in children, fever of unexplained origin always indicates a careful urinalysis. Gastro-intestinal upsets—anorexia, indigestion, "biliousness," "gastritis," nausea or vomiting—occur in half of all cases of renal tuberculosis. There may be failure to gain or loss of weight. The children are usually anemic, underdeveloped, frail and irritable; they do not "do well." On the other hand, 1 of our patients (case 4) was much overweight. When the second kidney is markedly involved by tuberculosis or by tuberculotoxic nephritis, anemia develops, but the debilitated child usually dies of an intercurrent infection, notably pneumonia. Fatal acute miliary disease may occur.

DIAGNOSIS

Although a thorough general physical examination is prerequisite and will often suggest renal tuberculosis, the correct diagnosis is made by complete urologic examination. Urinalysis discloses albuminuria, pus cells, usually red cells and hyaline and granular casts, and careful search for tubercle bacilli reveals the organism in from 80 to 90 per cent of all cases. In girls, only catheterized specimens of urine are

worthy of examination; in boys, a satisfactory specimen may be obtained by voiding after the prepuce has been well retracted and the meatus well cleansed.

For bacterial examination, the urine is centrifugated at 2,500 revolutions per minute for fifteen minutes; the sediment is thickly spread on the slide and stained by the Ziehl-Neelsen acid-fast technic. Short examination of daily smears is more profitable than prolonged search in a single slide. Smears are most likely to be positive following cystoscopy and pyelography. When the smear is repeatedly negative and the results of urologic examination are indefinite, inoculation of urine into guinea-pigs may identify the tuberculous infection.

A preliminary roentgenogram of the urinary tract may show calcified tuberculous renal lesions (fig. 6), stones, the renal outlines and congenital or inflammatory bony lesions. Total renal function is estimated by the phenolsulphonphthalein test and chemical analysis of the blood (nonprotein nitrogen or urea). Cystoscopy is performed under general, spinal, caudal or local anesthesia; in juveniles, general anesthesia is required in about half. The bladder shows congestion, edema, tubercles, ulceration, granulation, generalized sclerosis or ureteral retraction, according to the intensity, duration and repair success of the vesical disease. Sometimes the picture of the bladder is normal. The early lesions are most marked about the ureteral orifice of the involved side. Catheterization of the ureter, with the collection of specimens, and a dye function test (we use indigo carmine) are performed, and, usually, pyelography of the involved side is also performed. I have never seen an ill effect from pyelography in children. When the ureter is impassable, intravenous pyelography must be employed (figs. 3 and 5), as in 3 of our patients. The urogram of chronic renal tuberculosis may be characterized by a motheaten pelvic outline, caliceal distortion or contracture, pelvic irregularity, ureteral stricture or, in some cases, hydronephrosis or complete pelvic blockage. Early lesions are often confined to one calix; the remainder of the tract is normal. Localized pyelographic shadows in the parenchyma beyond the calices are pathognomonic of tuberculous necrosis.

TREATMENT

Because spontaneous healing of chronic renal tuberculosis has never been satisfactorily proved, treatment by nephrectomy should be instituted at once when the disease is unilateral. When tubercle bacilluria exists without urographic pelvic changes, operation should be withheld until such a time as the diagnosis is not questionable. Especially in children, nephrectomy in the presence of evident bilateral tuberculosis is contraindicated (case 5). Tubercle bacilli in both specimens from the ureter do not necessarily mean bilateral renal tuberculosis; in such cases

the organisms may have entered the catheter by ureteral reflux from the infected bladder. Urographic and functional evidence merits great consideration.

In unilateral disease, severe toxic nephritis of the better kidney commonly disappears following removal of its more seriously diseased mate.

In some instances, treatment in a sanatorium before operation is of value, and its equivalent for a few months after operation should be insisted on. Tuberculin therapy merits no great reliance in these cases.

Attempts to avoid postnephrectomy tuberculous wounds have led to many special operative procedures, including: (1) removal of all perirenal fat, (2) bringing of the ureteral stump into a lower loin skin wound and (3) intra-ureteral injection with phenol. In a series of 282 cases reported by Walters,[8] who practiced injection of phenol into the ureter at the point of excision with complete closure of the wound except for a small cigaret drain for forty-eight hours, primary union resulted in 48 per cent, secondary healing in 27 per cent and temporary fistula in the remaining fourth.

The prognosis in children is somewhat less favorable than in adults; it can be approximately inferred from older patients. In 316 cases in which operation was not performed, reported by Wildbolz,[7] 58 per cent of the patients were dead within five years; after ten years, only 6 per cent were alive. In a similar series of cases in which operation was performed, reported by him, 59 per cent of the patients were alive and well ten years after operation. The operative mortality varies from 1.3 (Hunt) to 10 per cent or more. Most deaths occur during the first two years after operation. Within this time, about a fifth of these patients will die of tuberculosis of the genital tract. Urinary symptoms persisting longer than two years may be considered permanent. These are due to either (1) a persistent tuberculous or nontuberculous infection or (2) a sclerotic contracted bladder or bladder outlet.

REPORT OF CASES

CASE 1.—*History.*—R. G., a boy, aged 8 years, was admitted to the Children's Medical Service of Bellevue Hospital on April 11, 1926, because of hematuria of one day's duration. For the past few weeks there had been urinary frequency and pyuria with occasional febrile attacks. The past history was irrelevant except for measles and whooping cough. There had been no known exposure to tuberculosis, nor had there been gastro-intestinal upsets. Physical development was normal.

Physical Examination.—This revealed a well nourished, well developed colored boy with slight tenderness in the right costovertebral angle; it otherwise gave negative results.

Urologic Examination.—Urinalysis showed the urine to be cloudy and acid, with albumin, 1 plus; sugar, 0; red blood cells, 1 plus; white blood cells, 2 plus; occasional hyaline and granular casts, and Bacillus coli. Plain roentgenograms

of the urinary tract showed no abnormal shadows. The right renal outline was slightly larger than the left. The estimation for nonprotein nitrogen was 31 mg. per hundred cubic centimeters of blood; the two hour intramuscular phenolsulphonphthalein output was 42 per cent.

Cystoscopy.—On April 15, cystoscopy was performed with the patient under general anesthesia. An instrument was passed without difficulty. The urine from the bladder was hazy; the picture of the bladder was that of a mild generalized cystitis with slight edema about the right ureteral orifice. Both ureters were catheterized without difficulty, a clear sparkling return being obtained from the left side and a cloudy return from the right. Intravenous phenolsulphonphthalein appeared in five minutes from the left side and showed a 7 per cent return in ten minutes. The time of appearance on the right side was eight minutes, with 3 per cent return. The right pyelogram showed an irregular, fuzzy, motheaten outline with an irregular upper ureter. Renal tuberculosis on the right side was diagnosed from a pyelogram (now lost) and was confirmed by the demonstration of tubercle bacilli, pus and blood in the ureteral specimen from this side; these findings did not exist on the left side.

Operation and Course.—Nephrectomy for renal tuberculosis was carried out in the usual manner; there was marked perinephritis. The organ removed showed far advanced caseocavernous tuberculosis with marked tuberculous involvement of the upper ureter. Recovery was uneventful, and the boy was discharged on the sixteenth day with the wound closed. There has been no follow-up.

CASE 2.—*History.*—T. B., a boy, aged 7 years, was referred by Dr. R. T. B. Todd of Tarrytown, N. Y., on July 10, 1930, with a history of enuresis and pyuria. Enuresis four times nightly had existed since infancy; pyuria had been noted for two years. He urinated every one to two hours during the day, with occasional day wetting. The patient had been exposed to a tuberculous uncle, and had had eczema, chronic otitis media, chickenpox, whooping cough and mumps; three years previously, radical mastoidectomy had been performed, and right empyema was present.

Physical Examination.—The patient was a slender, pale, underdeveloped boy who had a discharge from the right ear and the scar from drainage of the previous empyema. Neither kidney was palpable. Examination of the chest was questionable for tuberculosis.

Urologic Examination.—Urinalysis showed the urine to be cloudy and acid, with a specific gravity of 1.016; albumin, faint trace; sugar, 0; red cells, occasional; pus cells, 3 plus; scattered hyaline and granular casts, and tubercle bacilli. The phenolsulphonphthalein output was 35 per cent in two hours; the estimation for nonprotein nitrogen was 32 mg. per hundred cubic centimeters of blood. A plain roentgenogram of the urinary tract was negative.

Cystoscopy.—This was done with the patient under open drop anesthesia. Following meatotomy, the cystoscope was passed to the bladder without great difficulty, although a definite obstruction was encountered in the deep urethra and gave the sensation of being a mucosal fold, possibly a valve. Residual urine of 4 ounces (118.4 cc.) was noted. The wall of the bladder showed slight trabeculation. The left ureteral orifice was normal; the right was extremely red and indurated. The vesical outlet was tight; the lower lip was elevated, and there was a shallow basfond. The verumontanum was somewhat larger than normal; just anterior to its extremity was a small transverse mucosal leaflet which may have caused some obstruction. A catheter was passed to the left renal pelvis without difficulty. A slightly bloody but otherwise normal urine was returned. On the right side it

was impossible to pass a catheter higher than 3 cm., although ten different catheters were tried. A cystogram and left pyelogram were then made; both were normal. A week later intravenous urography was performed, which showed a normal left upper tract in ten minutes, but not until the forty-five minute picture was dye seen in the right pelvis. The picture at one hour indicated pyonephrosis on the right side but was hardly clear enough for reproduction here. Nephrectomy on the right side for tuberculosis was advised.

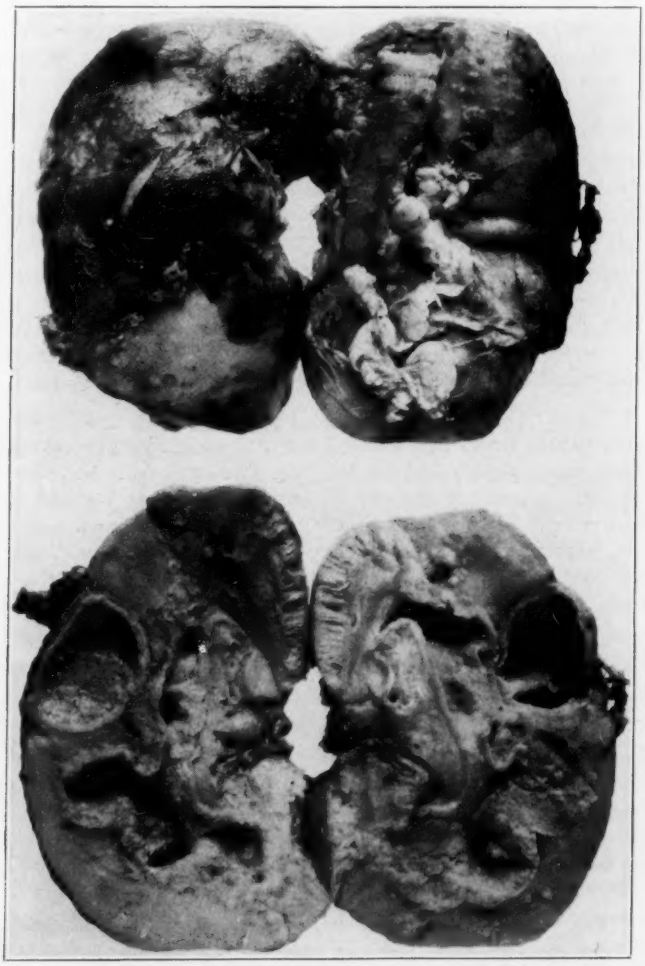

Fig. 1 (case 2).—Caseous kidney removed from a 7 year old boy. On the cortical surface many tubercles are seen; in the section, caseous tuberculosis is widespread. In the upper picture, the greatly thickened ureter is noted.

Operation and Course.—On July 28, with the patient under general anesthesia, the right kidney was exposed and delivered from an extremely high location. There was moderate sclerotic perinephritis; the ureter was greatly thickened, and the pedicle was thick and short. Following clamping of the pedicle and removal of

the kidney, the short thickened pedicle slipped through the hemostats, with profuse hemorrhage. This was stopped by copious packing held under considerable pressure. After twenty minutes, the pedicle was successfully caught and ligated. The wound was closed with cigaret drainage.

The kidney showed advanced caseocavernous tuberculosis with many cortical tubercles (fig. 1).

Although the amount of blood lost at operative accident was not alarming, transfusion was given the day following operation. The patient made an uneventful recovery (fourteen days) except for a loin sinus which did not close for six

Fig. 2 (case 3).—Urogram of renal tuberculosis on the right side (picture reversed) in a girl of 3 years who was suffering with so-called chronic pyelitis. The pelvis is incompletely filled. The calices are rounded and dilated. The ureter is dilated and somewhat irregular above. The removed organ showed tuberculous hydropyelonephritis. The opposite (left) pyelogram was normal.

months. At the end of this time, the urine still showed occasional pus cells, but the urinary schedule was normal and enuresis had ceased.

In addition to the tuberculous disease, this boy presented an obstruction at the outlet of the bladder. The question remains unsettled whether it was due to a congenital contracture of the neck of the bladder (as the history of enuresis from infancy might suggest) or to sclerotic contracture secondary to tuberculous vesical inflammation, which seems more likely. An opportunity for follow-up has not been afforded.

CASE 3.—*History.*—M. F., a girl, aged 3 years, was referred by Dr. Irving Okin of Passaic, N. J., on June 14, 1930, because of pyuria of one year's duration with failure to gain weight. Ten weeks previously she had suffered from "acute pyelitis" with hematuria. During the past few months, she had urinated from every one to two hours during the day and once at night. Burning on urination was usually present; digestive upsets had been frequent. There had been no previous illnesses except whooping cough five months previously.

Physical Examination.—This revealed a frail, anemic, poorly nourished, irritable girl whose physical findings were otherwise normal. The right kidney could be felt.

Urologic Examination.—Urinalysis showed the urine to be cloudy and acid, with clumps of pus; a specific gravity of 1.014; albumin, faint trace; sugar, 0; pus, 4 plus; red cells, few, and tubercle bacilli. Plain roentgenograms of the urinary tract were normal.

Cystoscopy.—On June 19, with the patient under general anesthesia, cystoscopy revealed a cloudy urine. The picture of the bladder was normal except that the left ureteral orifice appeared slightly smaller than the right. The right ureter was catheterized without difficulty; on the left side, there was a moderate obstruction 6 cm. up. A clear, deep, amber urine was obtained from the right side; a watery, somewhat cloudy urine was obtained from the left. Indigo carmine intravenously returned in medium concentration after fifty-five minutes from the right side; none returned from the left. A bilateral pyelogram showed an infected hydronephrosis on the left side; the right urinary tract was normal (fig. 2). Examination of a ureteral specimen revealed the following:

	Pus	Blood	Urea, Gm. per Liter	Bacteria	
				Culture	Smear
Right kidney	+	..	3.75	Sterile	No tuberculosis
Left kidney	+++	+	1.20	Sterile	No tuberculosis
Bladder	++	..	....	B. coli	No tuberculosis

In view of the urologic findings and the previous demonstration of marked tubercle bacilluria, a diagnosis of renal tuberculosis of the left side was made. This was confirmed at operation.

Operation and Course.—On July 2, with the patient under general anesthesia, a left tuberculo-hydronephrotic kidney was removed. There was moderate perinephritis. The renal parenchyma showed tuberculous pyelonephritis without caseation. The ureter was thickened, dilated and tuberculous.

Uneventful recovery followed operation, with discharge from the hospital on the thirteenth day. The primary healing of the wound was permanent. When seen three months later, the child had gained considerable weight and the urinalysis was negative, as it is now, two years after operation.

CASE 4.—*History.*—D. S., a boy, aged 11 years, was admitted to the Children's Medical Division of Bellevue Hospital on March 13, 1931, with a history of hematuria, chills, fever and pain in the right side. The patient had been well until six weeks before, when terminal hematuria occurred. One week before admission he had suffered from an acute attack of pain in the right lower quadrant, followed by chills and fever, for which he had spent the week in bed. The past history was negative for exposure to tuberculosis. His previous health had been excellent except for measles, whooping cough and an occasional sore throat. He had always slept well; the appetite and digestion had been good, and the bowels were regular.

Physical Examination.—The patient was an obese boy who did not look sick. Examination of the chest gave negative results. There was slight tenderness over the left kidney (congestive renorenal reflex?) and in both right and left costovertebral angles. Neither kidney was palpable.

Four days after admission to the hospital, the patient suffered from four separate, moderately severe attacks of epigastric pain which doubled him up, lasted from ten to fifteen minutes and did not radiate, except the last, which was referred to the right inguinal region.

Fig. 3 (case 4).—Intravenous urogram in 11 year old boy. Tuberculosis on the right side (picture reversed) with caliceal and ureteral dilatation and irregularity. The left upper tract was normal. The removed organ is shown in figure 4.

Urologic Examination.—Urinalysis showed the urine to be cloudy and acid, with a specific gravity of 1.016; albumin, 2 plus; sugar, 0; casts, 0; red blood cells, 3 plus; white blood cells, 4 plus, and streptococci. Plain roentgenograms of the urinary tract were normal. Chemical analysis of the blood showed: nonprotein nitrogen, 29 mg. per hundred cubic centimeters of blood, and chlorides, 482 mg. The two hour phenolsulphonphthalein output was 60 per cent the first hour, and 15 per cent the second.

Cystoscopy.—On March 17, cystoscopy was performed with the patient under procaine hydrochloride anesthesia. The urine from the bladder was grossly cloudy. There was a mild generalized cystitis; the left orifice was normal. The right

ureteral orifice was edematous and sclerotic; the opening was exceedingly small and impassable to instruments. A catheter was passed to the left renal pelvis; a specimen was collected and found normal.

On March 19, intravenous urography was performed, 20 Gm. of skiodan being used. The left upper tract was normal; the right pyelogram was rather typical of tuberculosis (fig. 3).

On March 24, under local anesthesia, cystoscopy was again performed, at which time I was able to pass a catheter 20 cm. up the right ureter, and 20 cc. of hazy urine was withdrawn without difficulty. A right pyelogram was similar to that after intravenous injection. Urine from the right side was injected into a guinea-pig, which died of tuberculosis in two months. Meanwhile, many repeated examinations of the urine from the bladder for tubercle bacilli were negative. With the confirmation of the diagnosis of tuberculosis by a guinea-pig test, nephrectomy was advised, and was performed on June 4.

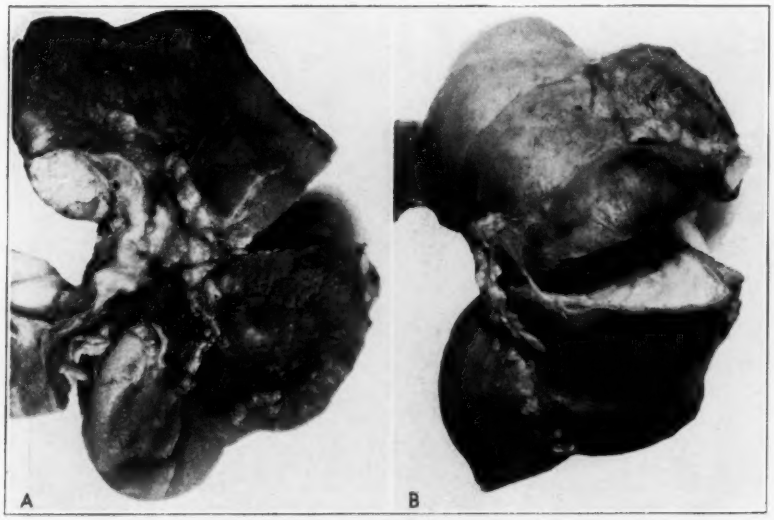

Fig. 4 (case 4).—Kidney removed. *A* shows a diffuse tuberculous invasion of the parenchyma with contraction and scarring of the pelvis. In *B*, the large (3 by 3 cm.) caseous abscess or posterior renal surface was buried deeply in the underlying muscle. Curiously, it did not communicate with the pelvis. Numerous daily examinations of the urine for tubercle bacilli were negative; a guinea-pig test revealed the organisms.

Operation and Course.—The kidney was found enveloped in an unusually thick, perinephritic, fatty envelop to which it was densely adherent. The ureter was half an inch (1.27 cm.) in diameter and greatly indurated. On the posterior renal surface a caseous intrarenal abscess (fig. 4) was found deeply embedded in the psoas muscle. The kidney was removed together with 3 inches (7.6 cm.) of ureter. Complete closure with cigaret drainage was carried out.

Afebrile convalescence followed, with discharge from the hospital on the sixteenth day with a fistula at the point of the cigaret drainage. Two weeks later, three fistulas had opened anteriorly, one of which, in the middle of the wound, still persisted one year later.

The boy has become about 30 pounds (13.6 Kg.) overweight. Sometimes the urine is normal; sometimes it contains pus. Tubercle bacilli cannot be found by smears, but six months after operation the guinea-pig test was still positive.

CASE 5.—*History.*—T. D., a boy, aged 7 years, was admitted to the Children's Medical Service of Bellevue Hospital on April 25, 1932, with an immediate history of urinary frequency and urgency of six weeks' duration. With the acute onset, the child voided sixty times in twenty-four hours; two weeks later the frequency

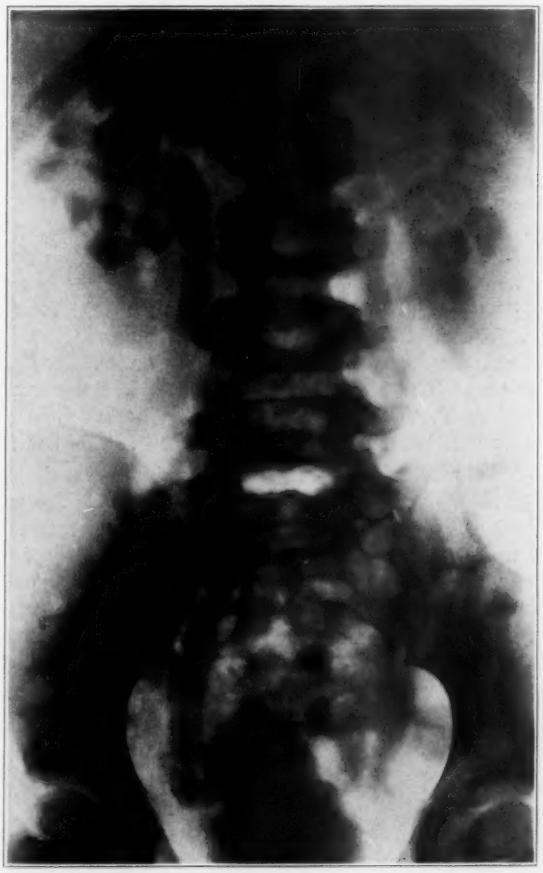

Fig. 5 (case 5).—Bilateral renal tuberculosis (intravenous urogram) in boy of 7 years. A diffuse pulmonary tuberculosis was first identified at the age of 3 years; at this time a tuberculous left eye was removed. Urosurgical treatment is contraindicated.

was forty times a day; three weeks previous to admission, there was a transient hematuria, and at the time of admission to the hospital he was voiding from twenty to thirty times a day. There was no pain.

The father was in a tuberculosis sanatorium; the mother, brother and sister were apparently normal.

The patient had had convulsions at 1 year, measles at 3 years, whooping cough at 5 years and frequent colds. At the age of 3 years, pulmonary tuberculosis of the miliary disseminated type was diagnosed. At this age, a tuberculous left eye was removed. One year prior to admission the child had spent six months in a tuberculosis sanatorium, but did so poorly that he was removed by his mother.

Physical Examination.—The boy was pale, underweight and undernourished and looked chronically ill. The left eye was absent; the right was normal. The tonsils were moderately enlarged and injected. The lungs were resonant throughout and crepitant; râles were heard at the left apex and over the right upper lobe posteriorly. In the right supraclavicular fossae there was an area of amphoric breathing. A palpable mass in the right upper quadrant was assumed to be a kidney. The terminal phalanges of the fingers were definitely widened; the nails followed the finger-tip curvature, but were not typically clubbed. Roentgenograms of the chest showed extensive exudative and fibroid tuberculosis throughout both lungs.

Urologic Examination.—A plain roentgenogram of the urinary tract was normal. Urinalysis revealed the urine to be turbid and acid, with albumin, 1 plus; sugar, 0; red blood cells, few; white blood cells, 3 plus. Examination of the blood showed: leukocytes, 12,000; polymorphonuclears, 74 per cent; large lymphocytes, 2 per cent; small lymphocytes, 10 per cent; mononuclears, 13 per cent, and basophils, 1 per cent. The hemoglobin was 60 per cent. The nonprotein nitrogen was 30 mg. per hundred cubic centimeters of blood; chlorides, 440 mg., and carbon dioxide, 34.3 per cent. The Mosenthal estimation showed a concentration range between 1.006 and 1.002. The two hour phenolsulphonphthalein output (intramuscular) showed: first hour, 22.5 per cent; second hour, 30 per cent.

Cystoscopy.—This was painlessly carried out with the patient under caudal anesthesia (10 cc. of 2 per cent procaine hydrochloride). The urine from the bladder was turbid. There was a generalized patchy cystitis, most marked over the right lateral wall, but involving also the left side of the bladder. On the right wall, there were innumerable pinhead-sized miliary tubules. Although instrumentation under caudal anesthesia was performed painlessly, relatively slight vesical distention caused considerable pain. Neither ureteral orifice was seen, nor could the trigonal boundaries be identified. Indigo carmine intravenously failed to return in fifteen minutes of cystoscopic observation and was found in the bladder in a faint trace only after twenty-five minutes. At this time a diagnosis of bilateral renal tuberculosis was made and intravenous urography advised. Intravenous urograms confirmed the diagnosis (fig. 5). Because of the marked bilateral involvement, surgical treatment was considered contraindicated.

Although no longer a child, the patient in the following case is of interest because of protracted urogenital tuberculosis from the age of 3 years.

CASE 6.—*History.*—J. F., a boy, aged 17, was admitted to the Urological Service of Bellevue Hospital on June 29, 1925, because of urinary incontinence and pain in the urethra following urination. Since 3 years of age, the patient had suffered from urinary incontinence, which repeated treatments in a hospital had failed to benefit. On admission to Bellevue Hospital, he was voiding every half hour during the day, and somewhat less often at night. There was marked urgency. If the patient did not void at once, incontinence resulted. He wet the bed nightly. The past history was otherwise negative.

Fig. 6 (case 6).—Calcified caseous tuberculous kidney in a 17 year old boy who had had symptoms of active urinary tuberculosis from the age of 3. Nephrectomy was performed.

Fig. 7 (case 6).—Cystogram, showing the bladder pushed far to the left by an enormous right tuberculous seminal vesicle (picture reversed). Seminal vesiculectomy was performed.

Physical Examination.—The prostate was irregular and boggy. The left seminal vesicle was not enlarged, but was slightly indurated. Bimanual rectal examination revealed the right seminal vesicle as a hard, elongated mass adherent to the pelvic wall. Examination was otherwise normal.

Urologic Examination.—Urinalysis showed the urine to be turbid and acid, with a specific gravity of 1.015; albumin, trace; sugar, 0; much pus, and residual, 1½ ounces (45 cc.). The phenolsulphonphthalein output was 25 per cent the first hour, and 20 per cent the second. The nonprotein nitrogen of the blood was 34 mg. per hundred cubic centimeters. A blood count showed 13,900 leukocytes, with 82 per cent polymorphonuclears and 18 per cent lymphocytes. A plain roentgenogram of the urinary tract showed an irregularly calcified right tuberculous kidney (fig. 6); there was no spondylitis of the lumbar vertebrae. Roentgenography of the lungs suggested a fibrotic lesion of the right lower lobe with calcification of the right pulmonary lymph nodes. A cystogram showed the bladder pushed far to the left by the greatly enlarged tuberculous right seminal vesicle (fig. 7).

Cystoscopy.—At an initial cystoscopy, an 18 F. instrument could not be passed to the bladder. At a second cystoscopy on July 27, with the patient under spinal anesthesia, a cystoscope was passed easily, though tightly held. The capacity of the bladder was 1½ ounces. The wall of the right side of the bladder was flat and edematous and was covered with multiple petechial hemorrhages. There were numerous adherent tags of mucopus. The remainder of the bladder was normal, but the right orifice could not be seen. The floor of the posterior urethra was irregular, with transverse sclerotic bands and rounded pockets between (tuberculous stricture). Indigo carmine intravenously appeared from the left side in six minutes in medium concentration; none was seen to issue from the right side. A left catheter was passed. Another catheter was left in the bladder for collection of a renal specimen from the right kidney. Examination of the specimens thus collected showed: left, urea 14 Gm. per liter, many red blood cells, occasional white blood cells and colon bacilli; right (specimen from bladder), urea 4.9 Gm. per liter, many red blood cells, occasional white blood cells and a few colon bacilli. No tubercle bacilli were found. The diagnosis was renal tuberculosis of the right side.

Operation and Course.—Nephrectomy on the right side was performed on August 5. The removed organ was of about normal size, but was thoroughly destroyed by tuberculosis; the pelvis and calices were enlarged and filled with a white cheeselike, homogeneous material. The patient was discharged as cured twenty-six days later.

The pathologic report was renal tuberculosis.

The patient was readmitted to the hospital two weeks following the previous discharge, complaining of hourly frequency with night bed wetting. At this time the right seminal vesicle was removed by the perineal route. The pathologic report was tuberculosis of the seminal vesicle. Recovery was protracted, but the patient was finally discharged three months later with the wound healed. He still suffered from day frequency with night wetting.

SUMMARY

Six cases of chronic renal tuberculosis in juveniles are reported. In all, persistent pyuria (so-called chronic pyelitis) was an outstanding symptom. In 2, urinary incontinence caused the diagnosis of enuresis to be made. Although surgical renal tuberculosis is not a common dis-

ease in children, in my experience it has been the underlying lesion in about 1 of every 65 cases of "chronic pyelitis." This observation serves to emphasize strongly the great importance of complete urologic examination in infants and children when pyuria persists longer than four weeks despite intensive medical therapy. The symptoms and urologic diagnostic procedures are identical with those observed in the disease in adults. In unilateral disease, early nephrectomy is the treatment, but with bilateral renal tuberculosis in children, nonsurgical treatment should be employed with full realization of a hopeless prognosis. With early radical treatment and proper postoperative care, especially of the sanatorium variety, complete cure may be expected in fully half of all cases.

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Case Reports

ACUTE LUPUS ERYTHEMATOSUS

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The acute form of lupus erythematosus differs from the chronic form of the disease with its localized lesions of the face in that it presents dissemination of cutaneous lesions to other parts of the body, serious constitutional symptoms and a highly fatal prognosis. It was first recognized by Kaposi [1] in 1872, and again described by Pernet [2] in his "Thèse de Paris" in 1908. The reports of many acute cases since then show a tendency to consider the disease in this form more as a constitutional illness than as a disease primarily of the skin. Acute cases may develop in people who have, or who have not had, previous manifestation of the usual lupus erythematosus.

The illness is especially one of the second to fourth decades of life, but is sometimes seen in childhood. The acute cases, as Goeckerman [3] said, seem to "masquerade" under the guise of other diseases. It has been my privilege to study two cases, especially in respect to the general influence of the disease clinically and pathologically.

REPORT OF CASES

The first case is characteristic of those that develop acutely.

CASE 1.—*History.*—J. L., a boy, aged 11¾ years, was admitted to the hospital on July 18, 1925, because of fever, a cutaneous rash, found chiefly on the face, and bleeding from the nose, lips and mouth. His family history was good except that an aunt, to whom he had been exposed, had a tuberculous hip. At birth he weighed only 6¼ pounds (2,840.9 Gm.), and through infancy he remained somewhat below normal in nutrition, although he was well. His tonsils and adenoids were removed

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1. Kaposi, Moritz Kohn: Neue Beiträge zur Kenntnis des Lupus erythematosus, Arch. f. Dermat. u. Syph. **4**:36, 1872.

2. Pernet, G.: Le lupus érythémateaux aigu d'emblée, Thèse de Paris, 1908-1909.

3. Goeckerman, W. H.: Lupus Erythematosus as a Systemic Disease, J. A. M. A. **80**:542 (Feb. 24) 1923.

at 2 years of age because of frequent "colds" and sore throat. Measles and pertussis, uncomplicated, occurred in the fourth year. Antitoxin treatment for diphtheria in the next year was followed by a moderately severe serum reaction. Later in the same year an unexplained cough persisted some time after several attacks of an influenza-like illness. His subsequent medical history remained unimportant until the last year, when he complained of a general feeling of tiredness and weakness in his legs.

The present illness started during April, 1925, with pain in the thighs. The pains were present with the extremities at rest; they were aggravated by exercise, and were unassociated with other symptoms. On May 17, a month after the onset, an erythematous eruption 0.5 cm. in diameter appeared on the patient's arms, elbows and gluteal regions. His temperature rose to 101 F. (38.3 C.), and he was confined to bed for two and one-half weeks. The cutaneous lesions persisted for only about ten days. In the differential diagnosis, food rash and scarlet fever were considered. After improvement the patient returned to school, but continued to have an afternoon rise in temperature to 100 F. (37.7 C.), by mouth.

TABLE 1 (case 1).—*Thrombopenia, Leukopenia and Anemia*

Date	Thrombocytes	Leukocytes	Erythrocytes	Hemoglobin Tallquist, Percentage
6/28/25	22.000	3,600	4,400,000	80
7/ 5/25	40,000	.....	.....	..
7/15/25	.....	6,200	5,080,000	55
7/18/25*	105,000	6,800	3,912,000	40
7/23/25	180,000	4,800	2,860,000	40
7/27/25†	270,000	5,600	3,130,000	45
7/30/25‡	.....	7,600	3,650,000	45

* Day of admission to the hospital.
† Two days after first transfusion, of 300 cc. of blood.
‡ One day after second transfusion, of 280 cc. of blood, and during the course of terminal pneumonia.

On June 23, about two months after the onset of the illness, severe pains returned in the legs, and on examination at that time the patient's mother found "black and blue" spots on his left thigh and ankles.

In the same week, a nosebleed persisted one hour. A physician found the spleen and some superficial, lymphatic glands to be enlarged. His temperature rose to 104 F. (40 C.), and he was put in bed and treated for typhoid fever. One blood-streaked stool was observed. An examination of the blood (table 1) on June 28 revealed a bleeding time of over one hour, low thrombocyte and leukocyte counts and, in the blood smear, polymorphonuclears 45 per cent, lymphocytes 49 per cent, basophils 5 per cent and large mononuclears 1 per cent.

A rash then appeared over the patient's face, starting about the nose and rapidly spreading over the entire face. The border was not raised. For one day there was slight edema over the right eye. The temperature remained at 104 F. (40 C.) for four days, and for the following two weeks ranged between 102 and 103 F. (38.8 and 39.3 C.). Bleeding from the nose, lips and buccal mucous membranes constituted a prominent symptom. No diarrhea occurred. A Widal test of the blood gave negative results. A blood count on July 15 showed continued low thrombocyte and leukocyte counts and a blood smear characteristic of those found later: polymorphonuclears (unsegmented) 22 per cent and (segmented) 41 per cent, early forms 8 per cent, basophils 2 per cent, small lymphocytes 25 per cent and large mononuclears 2 per cent. Many erythrocytes did not stain well.

Examination.—Because of insufficient evidence to explain the serious condition, the patient was taken to the hospital. His temperature was then 102.8 F. (39.3 C.), and he seemed somewhat apprehensive. The skin of his face looked red, thickened and sparsely covered with scales over the bridge of his nose. A blood crust partly obstructed his right nostril. His eyes and ears were normal. No ulceration could be seen to account for the bleeding from the lips, gums and mouth. His tonsils and adenoids had been removed, and his pharynx showed no congestion. His lungs and heart were normal except for a slight systolic murmur over the precordium. The skin of the hands was clear. Definite tenderness was elicited by palpation of the edge of the liver, 1 cm. below the right costal margin. The spleen extended 2 cm. below the ribs on the left. No other masses were felt in the abdomen. The only enlarged superficial lymph glands were in the inguinal regions.

Fig. 1 (case 1).—Dissemination of cutaneous lesions of acute lupus erythematosus on the face.

At the time of admission examination of the blood showed low thrombocyte and leukocyte counts (table 1). A Wassermann test and tuberculin tests of the skin gave negative results. The urine was normal. Cultures from the nose and throat were negative for Klebs-Löffler bacilli.

The condition was soon suspected of being acute disseminated lupus erythematosus because of the close resemblance to the description of that disease presented by Ormsby.[4] The dermatologic consultant, in confirming the diagnosis several days later, stressed the following points: the tendency of the lesions to scale, the symmetry of the lesions, the color, the discrete lesions on the palms, the high temperature and the duration of the illness. The patient grew weaker physically and mentally; at first he was indifferent to his parents, and finally was stuporous. His temperature varied between 101 and 105.6 F. (38.3 and 40.9 C.).

4. Ormsby, O. S.: Diseases of the Skin, Philadelphia, Lea & Febiger, 1921.

A consultant was unable to find any pathologic condition of the ears, nose or throat. Macular skin lesions similar to those on the cheeks appeared on the palms. The scaling of the facial eruption became much more extensive. The slight bleeding from the nose and mouth continued. The inflammation of the face, bleeding from the nose and lips, high temperature and anemia gave the patient a

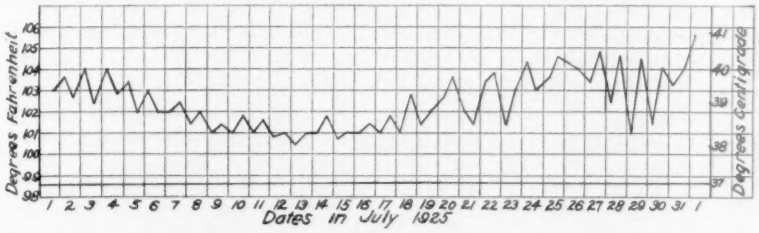

Fig. 2 (case 1).—Morning and evening temperature curves, showing a continued, irregular elevation of temperature, with wide fluctuations in the last five days.

Fig. 3 (case 1).—Dissemination of cutaneous lesions of acute lupus erythematosus on the palms.

strikingly septic appearance. In spite of this, a second blood culture failed to show any growth of bacteria. The urine was normal on each of three examinations. It also showed a variation of 10 points in specific gravity and a normal excretion of phenolsulphonphthalein when injected intramuscularly. The second Widal test of the blood, like the first, showed no agglutination. Chemical studies of the blood yielded the following results (all normal): nonprotein nitrogen, 25.3 mg.; chlorides

(whole blood), 545 mg., and sugar, 81.6 mg. per hundred cubic centimeters of blood. The concentration of the serum protein was 7.43 per cent.

No abnormal growth was secured in a culture of the stool. A smear from the gums showed no Vincent's organisms. Intradermal tuberculin tests of the skin, through 1 mg. (0.1 cc. of a dilution of 1 : 100) of Koch's old tuberculin, gave consistently negative results. Anemia and leukopenia persisted. One x-ray picture of the chest was reported as showing "bilateral thickening and congestion with calcareous infiltration in the right hilus region with acute, active changes. Possibly right hilus tuberculosis."

Two direct transfusions of 300 and 280 cc., respectively, of uncitrated, whole blood produced no clinical improvement. After the first few days in the hospital the patient suffered from an irritating cough and a hoarse voice, suggestive of laryngitis. Repeated clinical examination of the lungs showed them to be clear, except for occasional râles at the bases. Finally, in the last few days, the patient became comatose and cyanotic, with a rapid, weak, irregular pulse; he died on August 1. An examination of the spinal fluid, immediately post mortem, showed the fluid to be clear and negative to culture.

Autopsy.—Examination ten hours after death revealed the terminal lesions, bronchopneumonia in the lower lobe of the right lung and otitis media in the left ear. The laryngeal and tracheal mucous membranes were generally edematous, with minute, rounded swellings in the surface of the false cords. Sections of striated muscle looked pale, and the cardiac muscle was yellowish. The spleen was definitely enlarged (weight, 323 Gm.) and soft. Lymphoid glands in the tracheobronchial region were not enlarged, and the lungs showed no evidence of tuberculous infection. Of the lesions on the face, there remained only a pale brown desquamating area in the skin. One small suppurating wound was noted at the left elbow.

Three guinea-pigs were inoculated intraperitoneally with preparations from the hepatic, cervical and tracheobronchial glands. Autopsies on the first two animals six weeks later showed no tuberculosis. The third animal died soon after the injection and was discarded. Smears from the spleen showed no bacteria. Cultures from the mesenteric lymph nodes, kidneys, spleen, heart blood and liver were sterile.

CASE 2.—R. B., a Jewish boy, aged 11 months, was admitted to the hospital because of a cutaneous eruption on his face, refusal of food and diarrhea. This patient's family history was negative for tuberculosis and syphilis and was otherwise irrelevant. At birth, at full term, he weighed only 3½ pounds (1,587.5 Gm.). After nursing for two months, he was given well planned artificial feedings. A digestive disturbance complicated a respiratory illness at 6 months of age. He was always an undersized, but active child. According to his father, he had been able to say a few words and to stand.

The earliest evidence of illness started as an eruption on the patient's left cheek when he was 3 months old. The lesion began to spread in the ninth month and became very red. It presented some scales, but was not exudative or apparently pruritic. Six weeks later, at the age of 10 months, he was first seen in the medical dispensary for the eruption on his face and malnutrition (the weight was 11 pounds [4,989.5 Gm.]). A red "butterfly" lesion then covered the bridge of the nose. Both cheeks were scaling slightly, with some yellow crusting on the left. The first impression was that of eczema. After three exposures to ultraviolet rays the redness faded somewhat. On the second visit to the dispensary, lupus erythematosus

was suggested as the diagnosis and was later confirmed by the consulting dermatologist.

Subsequently the baby spent three weeks in the ward of another hospital for treatment of the cutaneous eruption, which practically cleared up. He gained weight for the first two weeks, but in the third week, as his cutaneous eruption continued to improve, he lost weight because of gastro-enteritis. He was taken home, and on each of the following eight days he had from eight to ten watery stools. During that time he received whole milk with about 5 per cent of added sugar, then lactic acid milk and finally a dry milk. At this time his face again became red, indicating a relapse toward the former condition, and he was admitted to our hospital ward on July 27, 1926.

Examination.—Physical examination revealed an infant weighing 9 pounds and 10 ounces (4,365.8 Gm.), with a rectal temperature of 100 F. (37.7 C.). He was somewhat dehydrated and very irritable. Both fontanels were closed. Over his nose and cheeks there appeared an erythematous eruption, in which slight scaling and capillary injection were visible. Its roughly circular border was not as well demarcated to touch as to sight. The rash did not extend over the ears. No other cutaneous lesions were present. His lips were dry, red and scaling, but the mucous membranes in the mouth were normal. Slight injection of the throat pos-

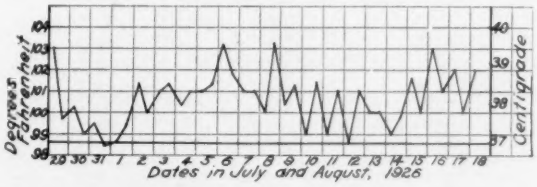

Fig 4 (case 2).—Curve, showing irregular elevation of temperature, with wide fluctuations in the last eleven days.

sibly accounted for the small cervical glands. He disliked all handling, resisted flexion of his neck and kept his lower extremities persistently flexed on his abdomen. His thorax, heart, lungs and abdomen presented no abnormalities. Neither testis could be palpated in the scrotum. The provisional diagnoses were acute lupus erythematosus and malnutrition.

The urine contained a trace of acetone and a few white cells in the sediment, microscopically. The blood count showed: hemoglobin, 81 per cent (Newcomer method); erythrocytes, 3,470,000; leukocytes, 5,400 per cubic millimeter, and, in the smear, polymorphonuclears, 27 per cent; small lymphocytes, 43 per cent; large lymphocytes, 21 per cent; transitionals, 9 per cent, and erythrocytes, normal in appearance. Blood cultures (aerobic and anaerobic) were negative. The Wassermann reaction of the blood was negative. The spinal fluid was clear, and showed 6 cells per cubic millimeter and a negative globulin and Wassermann reaction and culture.

Course.—The patient's temperature varied between normal and 103.4 F. (39.6 C.) by rectum. On a diet of protein milk, he continued to refuse food, vomit and have watery stools. In spite of frequent clyses, he was persistently dehydrated and toxic. He appeared alert mentally, but became very weak and thin after losing 2 pounds (907 Gm.) in three weeks. He continued to be irritable and cried at being touched. As his general condition became worse, the rash on his face grew

so faint as to be hardly recognizable. Petechiae appeared on his knees and later on his abdomen and chest. Dark dry crusts of blood covered his lips. Other than on his abdomen, where petechiae were numerous, the skin was quite dark, suggesting a generalized bronzing. A small, deep ulcer in the mucous membrane of his lower lip perforated the lip.

Twenty-five allergic skin tests, considered most appropriate in this case, were found negative. Intradermal tuberculin tests of the skin with as much as 2 mg. of Koch's old tuberculin, gave negative results. A Widal test of the blood gave negative results. Urinalyses, on four occasions after the one reported, gave negative results except for a trace of albumin. Examination of one stool showed no mucus, pus, blood or ova. The results of seven blood counts during the patient's three weeks in the hospital are reported in table 2. After the first examination of the blood, differential percentages were normal for the age, and the erythrocytes looked normal. The bleeding time was from four to five minutes. The clotting time was from four and a half to five and a half minutes. The thrombocyte count decreased

TABLE 2 (case 2).—*Thrombopenia and Leukopenia Uninfluenced by Three Transfusions*

Date	Thrombocytes	Leukocytes	Erythrocytes	Hemoglobin, Percentage
7/27/26	.....	5,400	3,470,000	81
7/30/26	280,000	3,000	3,890,000	..
8/ 2/26*	.....	2,800	5,420,000	99
8/ 4/26†	240,000	2,500	4,500,000	..
8/10/26‡	150,000	3,800	4,080,000	..
8/12/26	120,000	2,850	3,980,000	74
8/16/26§	.....	2,150	4,370,000	87

* Two days after first transfusion, of 90 cc. of blood, citrated.
† One day after second transfusion, of 65 cc. of blood, citrated, from the same donor (mother.)
‡ The blood of the donor of the first two transfusions on this date showed 7,500 leukocytes per cubic millimeter.
§ Two days after third transfusion, of 90 cc. of blood, citrated, from the father.

progressively as the hemorrhagic tendencies, indicated by the petechiae and bleeding lips, increased. It may be seen from table 2 that the marked leukopenia and falling thrombocyte counts were not affected by transfusions.

Quinine sulphate, as recommended by some writers, was administered in doses of 2 grains (0.12 Gm.) twice daily, without improvement. On August 18, the patient continued to have fever; he became stuporous and dyspneic; abdominal distention developed, and he died.

Autopsy.—The postmortem and pathologic studies in this case also failed to reveal any lesions that could be considered characteristic of the disease. Bronchopneumonia was the terminal lesion, and pneumococci were cultured from the pulmonary areas of consolidation. No evidence of tuberculous infection could be found after careful search for it. The thymus gland was very small, similar to that found in marasmic infants, showing "replacement of thymic tissue by connective tissue." Ulcers that had apparently developed in the intestinal mucosa ante mortem penetrated to the innermost portion of the muscular coat and contained staphylococci. Surrounding the spinal cord was a soft, gelatinous substance between the meninges and the bone, but the cord was normal in structure. Bone marrow from the vertebrae, ribs and right femur showed no abnormality.

COMMENT

No constant etiologic factor has been found in lupus erythematosus. It has been held by some writers that the disease was a response to a tuberculous infection; by others, a response to toxic or septic causes, and by still others, a response to the sensitization of body cells to products of impaired metabolism or of bacterial origin. The theory of tuberculosis is an old one based on the frequent association of tuberculosis with lupus erythematosus, and it is still held by many students of the disease. Many cases,[5] however, studied clinically and by postmortem examination for tuberculous infection, have shown no evidence of the disease. The toxic or septic theory [6] was suggested largely by the similarity of the onset, course and termination in cases of acute lupus erythematosus to those in cases of acute toxemia; the reported association of the disease with general toxemias resulting from cirrhosis of the liver, pneumonia and diseases of the kidneys, and the resemblance of the histologic structure of the cutaneous lesions to those of erythema multiforme (of known toxic origin). A similarity has also been pointed out between the course of acute lupus erythematosus and that of malignant endocarditis. The theory of sensitization depends chiefly on the reactivity of many patients with lupus erythematosus to minute amounts of tuberculin, to a disturbance of foci of infection and to surgical procedures. Although the disease has been considered a symptom complex resulting from a variety of causes, the clinical syndrome is so constant in the acute cases that a single cause of the disease may some day be found. Social status has apparently no influence on the incidence of the disease, for it is found as frequently in private as in hospital practice.[6]

The cutaneous eruption is essential to the recognition of the disease, but is not always the first symptom or the subject of the patient's chief complaint. The rash begins in the acute disseminated form of the disease, according to Ormsby,[4]

> With erythematous patches on the face, which blend and cover the cheeks, nose, eyelids and ears. The face is edematous and swollen; and in some cases crusting occurs early. In certain of these the face assumes an erysipelatous aspect, which accounts for the description of the disease by Kaposi under the title "Erysipelas Perstans Facei." The eruption involves the hands and may extend over other areas. On the hands it may be erythematous, papular or purpuric. On the other portions of the body the eruption is multiforme.

5. (*a*) Pernet (footnote 2). (*b*) Clarke, F. B., and Warnock, A. W.: Lupus Erythematosus Acutus Disseminatus, California & West. Med. **24**:354 (March) 1926. (*c*) Gibson, R.: Fatal Cases of Lupus Erythematosus, with Postmortem, Brit. J. Dermat. **37**:232 (May) 1925. (*d*) Short, T. S.: Fatal Case of Acute Lupus Erythematosus, ibid. **19**:271, 1907.

6. MacLeod, J. M. H.: Lupus Erythematosus, Arch. Dermat. & Syph. **9**:1 (Jan.) 1924.

Symptoms were given in detail in twenty-seven reported cases [7] of acute lupus erythematosus, and the percentage incidence of some of the more important symptoms was calculated. The rash is one of the first signs in more than 50 per cent of cases. In other cases, it may follow the first signs by a period of from two weeks to eighteen months. In the twenty-seven cases reported, the disease started as the discoid type in four; as the subacute, disseminated type in six, and as the acute type in sixteen. Lassitude, rheumatic pains and gastro-intestinal symptoms sometimes accompany or precede the onset of the rash. The appearance of these manifestations of the disease before the rash in about 40 per cent of the cases points to the rash as a symptom, rather than the cause, of the disease. Fever occurs in more than 90 per cent of the cases, and is often high and of a septic type. The tendency to hemorrhage indicated by petechiae and bleeding from the nose, mouth and lips, is present in more than 50 per cent of the cases. Adenitis, most commonly of the cervical glands, is present in about 40 per cent, but inflammation of the pharynx is found in only about half that number. Abdominal pain, a symptom in about 20 per cent of the cases, is important because it has led to unnecessary operations. The liver and spleen are palpable in only about 10 per cent of the cases.

Leukopenia has been noted at some time in nearly every case reported with blood counts, and an increase above normal occurred only with an added infection. Leukopenia has been stressed by others [8] and is well illustrated in the cases presented here. The thrombocyte count was greatly reduced in both of these cases during the most hemorrhagic

7. (*a*) Keefer, C. S., and Felty, A. R.: Acute Disseminated Lupus Erythematosus, Bull. Johns Hopkins Hosp. **35**:294 (Sept.) 1924. (*b*) Robertson, W. E., and Klauder, J. V.: Lupus Erythematosus Disseminatus: Report of Fatal Case Associated with Disseminated Telangiectasis, Arch. Dermat. & Syph. **8**:487 (Oct.) 1923. (*c*) MacLeod, J. M. H.: Case of Lupus Erythematosus Associated with Nephritis, Brit. J. Dermat. **20**:162, 1908. (*d*) Pernet, G.: Acute Primary Lupus Erythematosus, ibid. **37**:227 (May) 1925; footnote 2. (*e*) Sequeira, J. H., and Belean, H.: Lupus Erythematosus: A Clinical Study of Seventy-One Cases, ibid. **14**:367 (Oct.) 1902. (*f*) Scholtz, H.: Lupus Erythematosus Acutus Disseminatus Hemorrhagicus, Arch. Dermat. & Syph. **6**:466 (Oct.) 1922. (*g*) Brown, G. A.: Acute Lupus Erythematosus, New York M. J. **106**:931 (Nov. 17) 1917. (*h*) Barber, H. W.: A Case of Acute Lupus Erythematosus, Brit. J. Dermat. **27**:365, 1915. (*i*) Low, R. C.; Logan, W. R., and Rutherford, A.: Fatal Case of Lupus Erythematosus with Post Mortem, ibid. **32**:253 (Aug.-Sept.) 1920. (*j*) Goeckerman (footnote 3). (*k*) Clarke and Warnocke (footnote 5 *b*). (*l*) Gibson (footnote 5 *c*). (*m*) Short (footnote 5 *d*).

8. Stokes, in discussion of Strauss: Lupus Erythematosus, Arch. Dermat. & Syph. **17**:744 (May) 1928. Stewart, C. C., Jr., and Goeckerman, W. H.: Lupus Erythematosus Disseminatus Acutus in a Juvenile, Am. J. Dis. Child. **42**:864 (Oct.) 1931. Goeckerman (footnote 3). Clarke (footnote 5 *b*).

phase of the illness. In one case the bleeding time was one hour, and the coagulation time was "greatly prolonged." It is noteworthy that blood cultures are so uniformly sterile. In fourteen of the cases in which blood cultures were made, they proved to be sterile in twelve. In one case [7a] of pericarditis Streptococcus viridans was found. Another [5e] showed positive streptococcus cultures from both the tonsils and the blood during the illness. In one case [7i] with a negative blood culture twenty-three days before death, a pure culture of long chain streptococci was found on cultivation of the heart blood at autopsy.

In the differential diagnosis, the groups of cases to be considered depend, according to Goeckerman, on the predominating symptoms in a given case. In some cases, as in case 1, there are general toxic symptoms that would suggest typhoid fever, rheumatic fever, pneumonia, endocarditis, etc. Other cases, with cutaneous lesions predominating, resemble erysipelas, eczematoid dermatitis, etc. In other cases, abdominal symptoms predominate, suggesting an acute pathologic process in the abdomen. Important aids in diagnosis are such symptoms as rheumatoid pains, profound exhaustion, hemorrhagic tendencies [9] and irritability out of proportion to any evident cause. The only laboratory finding of constant value is leukopenia. Albuminuria, although essentially absent in the two cases of this report, is a common finding.

A few of the most common complications of acute lupus erythematosus may be mentioned in the order of their frequency as follows: pneumonia, nephritis, suppuration, otitis media, reactivity, empyema, pericarditis, colitis and convulsions.

The usual duration of the disease from the onset of constitutional symptoms varies from two and one-half months to two years. There are remissions of from a few weeks to a few months in more than 50 per cent of the cases. The most frequent terminal condition is bronchopneumonia, usually with coma or delirium. Exhaustion and nephritis are next in frequency. Of the twenty-seven patients in the reports under consideration, 93 per cent had died previous to the reporting of the cases.

The treatment of acute lupus erythematosus needs to be undertaken with great caution,[10] because of the excessive reactivity of some patients. The legion of remedies advised for lupus erythematosus has been found of little value in the acute cases. Some of the newer methods of treatment, still under observation and apparently worthy of further trial,

9. Roberts, L.: Acute Lupus Erythematosus (aigu d'emblée), Brit. J. Dermat. **23**:167, 1911.

10. Keith, N. M., and Rountree, G. G.: A Study of Renal Complications of Disseminated Lupus Erythematosus, Tr. A. Am. Physicians **37**:487, 1922. Goeckerman (footnote 3).

will be suggested. The intravenous use of gold preparations [11] (gold and sodium thiosulphate and others) should be considered, because of the improvement following their use in chronic cases. They may cause serious reactions,[12] and therefore should be used cautiously. Filtered roentgen treatments over the deep gland-bearing areas have helped in the hands of Goeckerman. Exposures to ultraviolet rays, although helpful in some cases, have proved to be a source of irritation in others. The removal of foci of infection seems to be indicated, but can be carried out only in proportion to the patient's ability to stand the effects of surgical trauma and disturbance of the infection. In our cases, because of the marked hemorrhagic tendencies, transfusions were used and found of little value except to improve temporarily the hemoglobin and erythrocyte counts.

No characteristic pathology has been found other than the local changes of the cutaneous lesions. Although evidence of tuberculous infection, sometimes extensive, has frequently been found at autopsy on patients with lupus erythematosus, it must be remembered that tuberculosis is a widespread disease. Acute lupus erythematosus characteristically produces lassitude and weakness for months, even in cases shown by postmortem studies to be nontuberculous. If general debility favors the activity and extension of a latent tuberculous pathologic process, it seems reasonable to expect that a large percentage of the patients who have died of acute lupus erythematosus should also show extensive tuberculous changes. In neither of the cases presented in this paper was any evidence of tuberculous infection demonstrated by tuberculin tests of the skin or by pathologic search at autopsy. Inoculation into guinea-pigs of suspensions of lymphatic gland substance of one patient gave negative results.

SUMMARY

Two fatal cases of acute lupus erythematosus are reported. One patient was only 1 year of age, the youngest yet found in the literature. From the study of these two cases and twenty-seven reported cases, the following symptoms should be especially considered: erythematous cutaneous lesions, rheumatoid pains, hemorrhagic tendencies, high temperature and leukopenia.

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11. Schamberg, J. F., and Wright, C. S.: Use of Gold and Sodium Thiosulphate in Treatment of Lupus Erythematosus, Arch. Dermat. & Syph. **15**:119 (Feb.) 1927. Davies, J. H. T.: Treatment of Lupus Erythematosus with Gold Compounds, Brit. M. J. **1**:12 (Jan. 5) 1929. Towle, H. P.: Present Status of Gold Therapy, New England J. Med. **204**:487 (March 5) 1931.

12. Simpson, in discussion of Strauss: Lupus Erythematosus, Arch. Dermat. & Syph. **17**:743 (May) 1928.

Laboratory findings are generally negative except for albuminuria in some cases. No clinical or necropsy evidence of tuberculosis was found in the two cases. The high rate of mortality from acute lupus erythematosus is emphasized.

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GALLSTONES IN CHILDREN

A CASE DIAGNOSED BY ROENTGEN EXAMINATION

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Reports of cases of disease of the gallbladder in children under 15 years of age would seem to indicate that this condition is not so rare as it is undiagnosed. Potter [1] collected from the literature reports of 226 cases of cholecystitis in patients under 15 years of age, and in at least 140 of these cases stones were found; in 38 cases, the presence or absence of stones was not noted. Kellogg [2] collected reports of 63 cases, to which he added the report of a case of his own; in 35 of these, stones were found. Beals [3] added to Kellogg's series reports of 60 cases, in 30 of which gallstones were definitely associated. In all of these cases, however, diagnosis was made at operation or at autopsy, and only in Beals' personal case was diagnosis made by roentgenologic examination previous to operation. The following case is reported in order to emphasize the value of such examination.

REPORT OF CASE

A girl, 11 years of age, was first seen at home five days before admission to the hospital, suffering from an attack of typical biliary colic with jaundice. The attack had been sudden in onset, was accompanied by no elevation of temperature, had lasted about one hour and was relieved by morphine. In the five days' interval before admission to the hospital the patient had had five such attacks.

The past history showed that the child's general health had been good; she had had whooping cough, measles, chickenpox and mumps, but had not had typhoid fever.

At the time of admission to the hospital, the positive findings on physical examination were marked jaundice, septic tonsils, slight enlargement of the heart with a systolic murmur over the mitral area and tenderness of grade III over the gallbladder.

Laboratory studies revealed a white blood count of 9,100 with a differential count of: neutrophils, 68 per cent; lymphocytes, 26 per cent; transitionals, 3 per cent; eosinophils, 2 per cent, and basophils, 1 per cent. The urine showed: a slight trace of albumin; bile, 4 plus; occasional pus and red cells, and urobilinogen in a dilution of 1:60; a negative Wasserman reaction; an immediate direct van

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From the Department of Pediatrics, Rees-Stealy Clinic.

1. Potter, Alfred H.: Gall-Bladder Disease in Young Subjects, Surg., Gynec. & Obst. **46**:795 (June) 1928.

2. Kellogg, E. L.: Gall-Bladder Disease in Childhood, Ann. Surg. **77**:587 (May) 1923.

3. Beals, J. A.: Cholecystitis and Cholelithiasis in Children, South. M. J. **21**: 666 (Aug.) 1928.

den Bergh reaction; complete color change in two minutes, and an icterus index of 35. The liver function test, in which 1.6 cc. of dye was given (the patient weighed 90 pounds [40.8 Kg.]), showed 30 per cent retention after thirty minutes and 7 per cent retention after sixty minutes.

Based on these findings, a diagnosis of stone of the common bile duct was made.

Prior to surgical intervention, however, a cholecystographic study was made. This revealed a dilated gallbladder which contained shadows of the density of stones, measuring 0.9 cm. in diameter.

At operation, ten days after admission to the hospital, the gallbladder was found to be greatly dilated, and stones were palpated. The liver was slightly enlarged and showed moderate hepatitis. Three stones were removed from the common duct, and cholecystectomy was performed. Eighteen small stones were found in the gallbladder. The patient made an uneventful recovery.

Cholecystograms showing dilated gallbladder containing stones.

The symptoms of cholecystitis and cholelithiasis in children resemble the symptoms of appendicitis, and are often accompanied by the latter. Jaundice usually appears either before or during an attack. There is pain in the right quadrant of the abdomen or near the umbilicus, and vomiting is present. The gallbladder may be palpated, and the liver may be larger than normal. Tenderness is elicited over the area of the liver and gallbladder, and there may be rigidity of the right rectus muscle. The blood count shows moderate increase in the number of leukocytes, and urinalysis shows the presence of bile. The icterus index is increased.

Reports of autopsies performed on infants have shown the presence of stones as such and also the presence of softer concretions which undoubtedly form the stones of later childhood. Such stones are proba-

bly congenital in origin. Stones may also form following a typhoid infection or may be the result of an inflammation of the gallbladder caused by a congenital narrowing of the cystic duct.

It is wise to keep in mind the fact that attacks of biliary colic similar to those occurring in adult life occur in childhood, and that in such cases the presence or absence of gallstones can and should be demonstrated by roentgen examination prior to surgical intervention. In many cases, as in this one, without the roentgenologic evidence, a clinical diagnosis of stone of the common duct alone would be made, and the presence of gallstones would remain unknown until operation brought them to light. Also in cases of gallstones alone, with no obstructive lesion of the common duct, cholecystography offers the most accurate means of arriving at a diagnosis.

INTESTINAL PERFORATION WITH PNEUMOPERITONEUM IN THE NEW-BORN INFANT

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GRAND RAPIDS, MICH.

Intestinal perforation in the new-born infant is a condition occasionally reported in the literature. Two cases recently came under my observation in which the presence of gas in the peritoneal cavity was demonstrated by roentgenograms. This finding prompted a diagnosis of perforation of the bowel. When the condition remains undiagnosed, the ensuing peritonitis leaves no hope of recovery. If the diagnosis is made in time, it is not impossible that prompt surgical intervention may save the infant's life. For this reason, I have thought it worth while to report these two cases, emphasizing especially the importance of roentgen examination in the presence of uncontrollable abdominal distention in a new-born infant.

REPORT OF CASES

CASE 1.—B., a boy, was born on May 20, 1930. The mother was a healthy primipara, aged 25. Gestation was at full term and the delivery was normal and spontaneous. The infant weighed 8 pounds and 6 ounces (3,796.8 Gm.), and appeared normal in every respect. On the second day the infant was put to the breast every four hours, and was given some water to drink in the intervals between feedings. During the afternoon the abdomen became somewhat distended, but the expulsion of meconium and flatus after a small enema had been given brought apparent relief. On the third day the abdominal distention recurred, but could not be relieved by enemas. The weight fell to 7 pounds and 4 ounces (3,288.5 Gm.). On the fourth day, the abdomen became more and more distended, and the infant began to vomit. Roentgenograms of the chest and abdomen showed a large amount of gas in the peritoneal cavity.

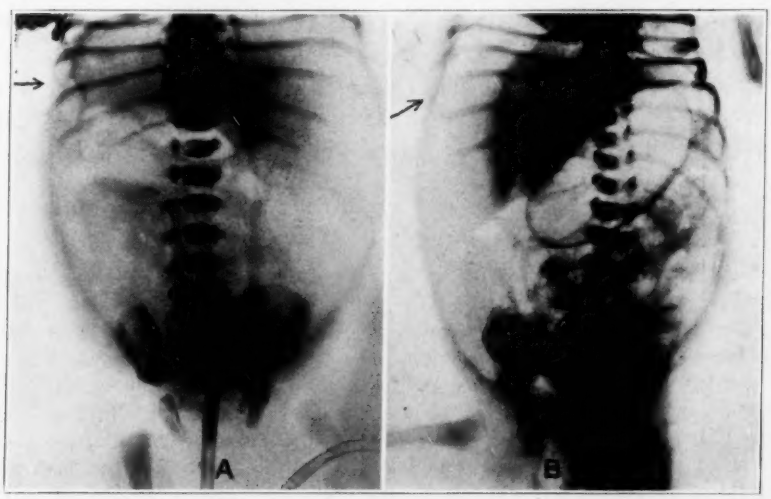
The diagnosis was intestinal perforation, peritonitis and pneumoperitoneum. Drainage of the peritoneal cavity was attempted, but death occurred the following day.

At autopsy, generalized peritonitis was found. The peritoneal cavity contained a small amount of gas. Parts of the small intestine were covered with a fibrinopurulent exudate. The transverse colon was red and swollen, and, underneath a mass of adhesions, there was a large perforation of the middle third. Fecal matter was oozing through the opening. A thorough search was made for congenital abnormalities, such as atresias, partial obstructions, diverticula or obstructing bands, but none were found in either the large or the small intestine, either proximal or distal to the lesion.

Microscopic sections of the colon about the perforated area showed the intestinal wall to be entirely necrotic and infiltrated with round cells. There was distinct thinning of the muscular layers from the periphery toward the rupture, until at the edge of the perforation no trace of the muscular layer could be found.

CASE 2.—R. R., a boy, was born on Nov. 14, 1930. The mother was a healthy multipara, aged 28. The infant was delivered spontaneously at full term. He weighed 6 pounds and 4 ounces (2,840.9 Gm.), and appeared normal at birth. On the second day he was put to the breast every four hours. During that day the abdomen became distended, but an enema of physiologic solution of sodium chloride brought some relief, with the expulsion of flatus and meconium. On the third day the infant began to vomit; the abdomen remained distended, respiration became difficult, and at times there was distinct cyanosis. The temperature was subnormal. On the fourth day the abdominal distention was so severe as to interfere seriously with breathing. Roentgenograms taken at that time showed the presence of gas in the peritoneal cavity; gas was seen to have infiltrated around the liver, separating it from the diaphragm and from the abdominal wall.

The diagnosis was pneumoperitoneum, peritonitis and intestinal perforation.



Roentgenograms taken on the fourth day of life, in the recumbent position, showing pneumoperitoneum: *A*, in case 1, and *B*, in case 2. In *B*, infiltrated gas separates the liver from the abdominal wall and from the diaphragm, which is elevated.

The infant died on the same day (the fourth day of life); permission for laparotomy had been refused. Permission for autopsy was also refused.

COMMENT

A recent writer [1] divided the cases of intestinal perforation of the new-born infant into two large groups. The first group embraces all cases that are associated with an obstruction of the bowel and in which the perforation occurs proximal to the obstruction. In the second group, the perforation is not associated with obstruction. According to the

1. Boikan, W. Sclair: Meconium Peritonitis from Spontaneous Perforation of the Ileum in Utero, Arch. Path. **9**:1164 (June) 1930.

same author, the latter group forms fully 50 per cent of all cases of so-called "meconium peritonitis" or "fetal peritonitis." His analysis (from the pathologic standpoint) shows that in twenty-three cases the site of predilection for perforation is primarily in the colon and in the terminal ileum.

Etiologically the condition in the cases not associated with obstruction is variously attributed to trauma, to meconium stasis, to intestinal aplasia with faulty or deficient innervation, to a primary vascular insufficiency and to congenital or acquired diverticula. Fischer [2] reported a case in which there was a double perforation: one at the tip of a diverticulum, and one through the wall of the colon itself distal to the site of the diverticulum. Hunter [3] reported a case of perforation of Meckel's diverticulum in a new-born infant. A case of "prenatal appendicitis with rupture and death" was reported by Hill and Mason.[4] The vast majority of case reports, however, are to be found in the German literature: An inaugural thesis read by Rudnew [5] in 1905 accounts for forty cases of varied etiology.

In the first case reported here the perforation occurred independent of any macroscopic malformation, such as strictures, bands or diverticula. The microscopic sections showed, besides the total necrosis of all the layers of the intestinal wall at the site of the perforation, a distinct thinning of the muscular layers as the section progressed toward the lesion. Furthermore, some fairly large blood vessels situated in the vicinity of the rupture appeared to be thrombosed, suggesting the possibility of mesenteric thrombosis.

The second case presents a striking roentgenographic demonstration of pneumoperitoneum in a new-born infant.

In conclusion I wish to point out the usefulness of the x-rays in the making of an early diagnosis. A stubborn abdominal distention beginning shortly after birth is the only symptom. Its persistence warrants roentgen examination.

321 Metz Building.

2. Fischer, Alfred E.: Fetal Peritonitis, Am. J. Dis. Child. **36**:774 (Oct.) 1928.

3. Hunter, W. C.: Perforated Gangrenous Meckel's Diverticulum in a Newborn Infant, Am. J. Dis. Child. **35**:438 (March) 1928.

4. Hill, W. B., and Mason, C. C.: Prenatal Appendicitis with Rupture and Death, Am. J. Dis. Child. **29**:86 (Jan.) 1925.

5. Rudnew, W.: Ueber die Spontanen Darmrupturen bei Foeten und Neugeborenen, Inaug. Diss., Basel, 1915.

CALCINOSIS CIRCUMSCRIPTA

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Calcification occurring in the skin, subcutaneous tissues and in the deeper structures, where calcium deposits are not normally found, is referred to in medical literature as calcinosis. In 1907, Reines [1] published the findings of a case of calcinosis under the title, "Petrificatio cutis circumscripta." Versé,[2] in 1912, described a case of calcinosis, calling the condition "calcinosis universalis," since the calcification involved not only the skin but also the deeper structures. Recently Steinitz [3] published a comprehensive review of the literature dealing with this type of abnormal calcification. He groups the 105 cases that he has gathered from the literature, including a case of his own, according to the classification suggested by Reines [1] and Versé.[2] Of these 105 cases he finds that 71 may be listed as calcinosis circumscripta and 34 as calcinosis universalis.

The reasons for this classification may be summarized as follows: 1. The abnormal calcification in calcinosis circumscripta is limited to the skin and the subcutaneous tissues. 2. Calcinosis circumscripta usually involves the extremities, and the deposition is frequently symmetrical. The deposition of calcium is often found about the joints, but the joints are not involved. 3. The prognosis is usually very good in calcinosis circumscripta but not in calcinosis universalis. Apparently calcinosis circumscripta occurs most frequently in the female, the ratio for the sexes being almost 6: 1, while in calcinosis universalis the distribution between the sexes is almost equal.

The abnormal calcification usually appears in middle life. Comparatively few cases have been reported in children, and only two cases in infants under 2 months. Tisdall and Erb [4] reported a case of cal-

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1. Reines, S.: Petrificatio cutis circumscripta, Arch. f. Dermat. u. Syph. **88**: 267, 1907.

2. Versé, M.: Ueber Calcinosis universalis, Beitr. z. path. Anat. u. z. allg. Path. **53**:212, 1912.

3. Steinitz, H.: Calcinosis circumscripta (Kalkgicht) und Calcinosis universalis, Ergebn. d. inn. Med. u. Kinderh. **39**:217, 1931.

4. Tisdall, F. F., and Erb, T. H.: Report of Two Cases with Unusual Calcareous Deposits, Am. J. Dis. Child. **27**:28 (Jan.) 1924.

cinosis universalis, which was observed in a boy 5 weeks old. Goldreich [5] published the findings in a boy 7 weeks old. It will be seen from the data on the case presented that it falls clearly in the group of calcinosis circumscripta.

REPORT OF A CASE

J. P., a white baby girl, was observed for ten days after birth and discharged from the lying-in hospital as an apparently normal infant. About four weeks later, she was brought to the outpatient clinic for treatment of an infection of the upper respiratory tract. The mother at this time directed the doctor's attention to peculiar, hard nodules in the subcutaneous tissue, which she had noticed soon after the infant left the hospital. These hard nodules began at the knees and extended up the thighs, including the buttocks, and laterally to the iliac crests. The masses were unevenly distributed around the thighs and hips.

The infant when seen in the outpatient clinic was in good condition. She had been given breast milk and a complement of cow's milk, and showed a gain on her first visit, when 6 weeks old, from 6 pounds and 13 ounces (3,068 Gm.), at birth, to 8 pounds and 3 ounces (3,685 Gm.). The infant thereafter gained steadily, so that at 2 months she weighed 9 pounds and 8 ounces (4,327 Gm.); at 4 months,

Daily Retentions of Calcium and Phosphorus in Millimols

	Phosphorus	Calcium
J. P. on cow's milk and cod liver oil, at 3 months.....	3.4	5.2
Normal infant on cow's milk and cod liver oil, at 3 months..	4.2	5.6

14 pounds and 5 ounces (6,542 Gm.), and at 8 months 17 pounds and 7 ounces (7,899 Gm.). At no time during the period of observation did the infant present any local or constitutional disturbances due to the abnormal condition in the subcutaneous tissues.

There was nothing unusual about her food. She had been given small amounts of cod liver oil and orange juice when she was 6 weeks old, and these two constituents were gradually increased. In addition to a cow's milk formula, which formed the basic diet, cereals were given at 4 months, and vegetables at 6 months.

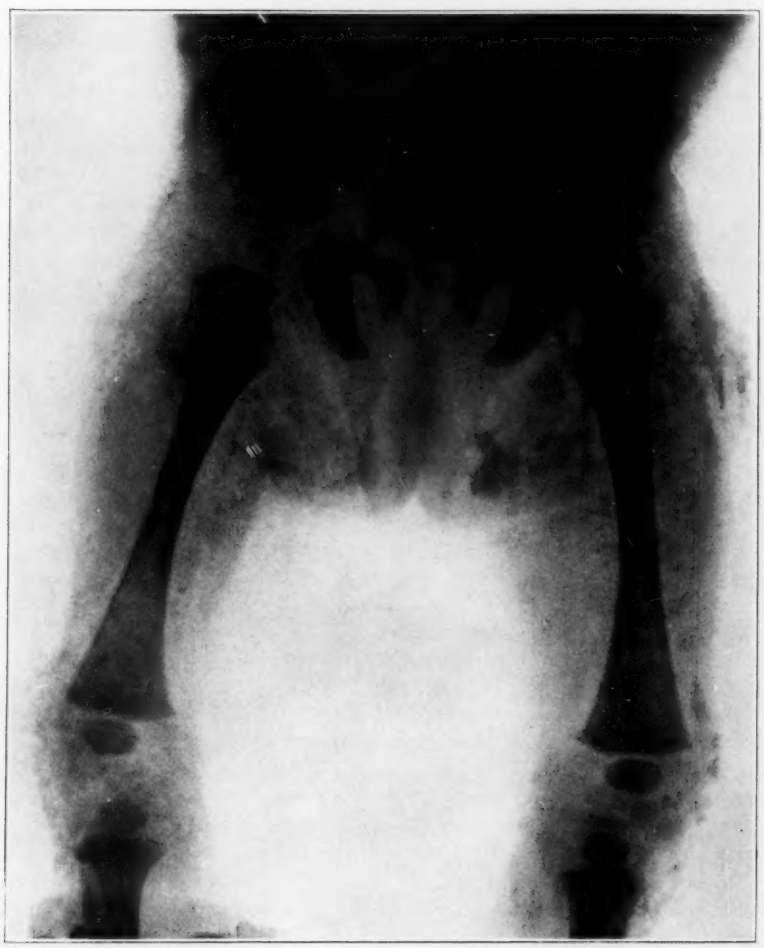
Frequent roentgenograms were taken during the period of observation. The roentgenogram accompanying this article was not the first one taken, but it is shown because it best illustrates the calcification. The first roentgenograms showed a denser calcification, with demonstrable nodules from 2 to 6 mm. in diameter. It is probable that the nodules became more discrete as the child grew. Evidently no new areas of calcification formed, since subsequent roentgenograms showed more clearing, the last one, taken when the infant was nearly 8 months old, showed complete absorption of calcified nodules.

The family history in this case was essentially negative. The mother gave a negative Wassermann reaction at the lying-in hospital. Both Wassermann and Kahn tests of the infant's blood at 2 months were negative. The calcium and

5. Goldreich, A.: Ein 7 Wochen alter Knabe mit Zellgewebsverhärtung, Mitt. d. Gesellsch. f. inn. Med. u. Kinderh. **13**:57, 1924.

cholesterol in the infant's blood was found to be, respectively, 10.2 mg. and 108 mg. per hundred cubic centimeters. Microscopic examinations of the blood and the urine revealed no abnormal changes.

When the infant was 3 months old, a metabolism experiment lasting for six days was carried out to determine the retention of calcium and phosphorus. The



This anteroposterior view shows the deposits of calcium salts in the subcutaneous tissues of the hips and thighs and around the knees.

table shows the results obtained and compares them with observations made of normal infants of the same age who were fed cow's milk. Apparently this infant, given cod liver oil, was not retaining abnormal amounts of calcium and phosphorus during the experiment for metabolism.

Similar metabolic experiments have been carried out for shorter and longer periods on patients suffering from calcinosis circumscripta by

Vaninini,[6] Umber[7] and Staub.[8] Their observations are inconclusive, however, because the values they obtained for the retentions of calcium and phosphorus show neither a significant nor a consistent variation from normal values. It may be supposed that had the experiments on metabolism been carried out in the case reported when the maximum deposition of calcium and phosphorus occurred, it would have been possible to show an abnormally high retention of these elements. When, however, the nodules are formed and a slow resorption takes place over a period of several months, any experiments undertaken during this time could scarcely be expected to give values showing significant variations from the normal.

COMMENT

Just why calcification occurred in this healthy, normal infant is impossible to explain. No inflammatory changes were ever observed, and it is impossible to believe that there could have been such an extensive degeneration of tissue cells where calcification did occur. Durham[9] in his article states, "Numerous observers say that deposits do not occur in normal tissue." While no biopsy was done, it would seem from the uneventful history of the infant that calcification can occur in apparently normal tissue.

The most interesting consideration about the case reported is the prognosis. We observed a case of calcinosis which developed in an infant soon after birth and by means of roentgenograms watched the lesions completely disappear within eight months. No therapy of any kind was used to influence the absorption of these calcified nodules. It may be said that in the readily accessible literature so far reviewed by the authors no therapy described offers any hope of effecting beneficial results in either type of calcinosis.

SUMMARY

1. A case of calcinosis circumscripta is reported in a girl infant 6 weeks old.

2. The infant completely recovered from the abnormal calcification, without treatment, within six months.

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6. Vaninini, G.: Zentralbl. f. d. ges. Physiol. u. Path. d. Stoffwechs. **6**:521, 1911.

7. Umber, F.: Ueber Kalkgicht, Berl. klin. Wchnschr. **58**:909, 1921.

8. Staub, V.: Untersuchungen über Kalkgicht, Beitr. z. path. Anat. u. z. allg. Path. **78**:67, 1927.

9. Durham, R. H.: Scleroderma and Calcinosis, Arch. Int. Med. **42**:467 (Oct.) 1928.

ANEMIA IN THE NEW-BORN

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AND
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In 1927, one of us (Dr. Bonar) reported the fifth case of so-called primary anemia of the new-born.[1] The frequency with which this condition has been observed is shown by the review of Pasachoff and Wilson,[2] who found that since the initial report of Ecklin[3] in 1919, fourteen cases have been recorded and fourteen more have been mentioned but not described. Subsequent to this review Happ[4] and McNiel[5] have reported two additional cases.

In January, 1931, after completing the examination of a normal newly born infant at the Salt Lake County Hospital, the surname of this infant was noticed to be identical with that of the infant described in 1927. Later investigation proved the two infants to be offsprings of the same mother but of different fathers. Examination of the blood taken on the day of birth showed results within normal limits, but because the older infant failed to show clinical evidence of anemia until the tenth day it was decided to make repeated examinations of the blood during the younger infant's sojourn in the hospital. Much to our surprise, the determination for hemoglobin and erythrocytes began to drop, and on the tenth day anemia was apparent to the naked eye. The baby was left at the hospital for adoption, which fortunately made it possible to follow the progress of the anemia over a period of several months, a course which could not be pursued with the other infant. No treatment was instituted in order that the findings should not be influenced by therapeutic factors. Therefore, the infant was given the

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From the New-Born Department of the Salt Lake General Hospital.

1. Bonar, B. E.: Anemia in the New-Born, Am. J. Dis. Child. **33**:226 (Feb.) 1927.

2. Pasachoff, H. D., and Wilson, L.: Congenital Anemia of the New-Born, Am. J. Dis. Child. **42**:111 (July) 1931.

3. Ecklin, T.: Ein Fall von Anämie bei einem Neugeborenen, Monatschr. f. Kinderh. **15**:725, 1919.

4. Happ, W. M.: Idiopathic Anemia in the New-Born Infant, Arch. Pediat. **47**:171 (March) 1930.

5. McNiel, C.: Primary Anemia in the New-Born, Edinburgh M. J. **37**:175 (Oct.) 1930.

standard nursery modified milk formula at intervals of four hours, and the blood picture was followed until it became normal, a matter of four months.

REPORT OF A CASE

CASE 1.—*History.*—A, a girl, was born on Jan. 10, 1931. This was the eleventh pregnancy in fifteen years, three of which had terminated spontaneously at six weeks, eight weeks and ten weeks, respectively. The mother's health had always been good. The first four children were alive and well. The fifth died on the eighth day of an umbilical hemorrhage. The sixth pregnancy terminated spontaneously at six weeks, and the product of the seventh pregnancy, the infant whose case was reported in 1927, was alive and well. The eighth pregnancy resulted in the birth of an infant described as normal, while the ninth and tenth pregnancies terminated spontaneously at ten weeks and eight weeks, respectively. The eleventh pregnancy resulted in the birth of the infant in the present case. This infant had a different father, whose history we were not able to obtain, except that he was in good health. The mother's health had been normal throughout this pregnancy; no drugs had been taken by her, and she was not anemic. She had not had venereal disease.

Labor occurred at full term, and birth was normal, with vertex presentation; the loss of blood was slight, according to the obstetric report, from 150 to 200 cc., and the birth weight was 7 pounds and 4 ounces (3,209 Gm.). The infant was not asphyxiated, and was apparently normal at birth.

Examination.—Six hours after birth the infant appeared normal and well developed. The skin was neither cyanosed nor pale. There was a small caput succedaneum over the vertex, and the head was nearly free from molding. The eyes, nose, mouth, ears, lungs and heart were normal; the spleen was not palpable, and the liver was palpable 1 cm. below the costal margins. The extremities showed no abnormalities, and the glandular system appeared normal. The temperature became slightly elevated on the third and fourth days, after which it dropped to normal. The initial loss in weight was 5 ounces (142 Gm.), which was regained on the twenty-second day. The infant continued to gain, and at the age of 5 months weighed 12 pounds and 2 ounces (5,504 Gm.). Examination of the blood on the first day (Jan. 10, 1931) showed: hemoglobin, 90 per cent (Dare); erythrocytes, 4,460,000; color index, 1.02; leukocytes, 11,600; neutrophils, 60 per cent; small lymphocytes, 30 per cent, and large lymphocytes, 10 per cent; no normoblasts were seen. The Wassermann test of the blood of the mother taken during pregnancy was negative, and the vaginal smears were negative for gonococci.

Course.—During the first week, the infant seemed normal; there was no unusual pallor and no icterus. An examination of the blood made on the eighth day (January 18) revealed: hemoglobin, 79 per cent; erythrocytes, 2,870,000; color index, 1.4, and leukocytes, 16,300; no differential count was made. Vaginal smears revealed no gonococci. By the tenth day pallor became perceptible, and on the twelfth day (Jan. 22, 1931) examination of the blood showed: hemoglobin, 35 per cent; erythrocytes, 2,240,000; color index, 0.79; leukocytes, 14,300; neutrophils, 29 per cent, and small lymphocytes, 65 per cent; slight anisocytosis and poikilocytosis were demonstrated, and polychromasia was definite. The Wassermann test of the blood was negative. The urine was normal, and there was no occult blood in the stools. The icteric index was 10 units. At this time the physical examination gave negative results save for the pallor. The spleen could not be palpated.

On the eighteenth day there was a slight increase in some of the elements of the blood: hemoglobin, 40 per cent; erythrocytes, 2,970,000; color index, 0.68, and leukocytes, 16,300; Shilling's index showed: myelocytes, 1; juvenile forms, 1; stab nuclei, 3; and segment nuclei, 42. The infant continued to be pale. It was thought that the spleen could be palpated but not with surety. No icterus was present, although the infant was sallow.

Twenty-four days after birth, examination of the blood showed: hemoglobin, 40 per cent (Dare); erythrocytes, 2,030,000; color index, 1.0; leukocytes, 12,100; neutrophils, 19 per cent; small lymphocytes, 62 per cent; large lymphocytes, 15 and transitionals 4 per cent. Polychomasia was still marked; thrombocytes numbered 246,000; the result of a fragility test of the erythrocytes was from 0.42 to 0.38 per cent; there were moderate anisocytosis and poikilocytosis, and occasionally normoblasts were seen.

The anemia had reached its height by this time, for on the twenty-ninth day there was improvement in the blood picture, although clinically no change was apparent. The hemoglobin was 52 per cent; the erythrocytes numbered 2,670,000; the color index was 1.0; the leukocytes were 11,400, and the differential count was practically the same as on the previous determination. On the forty-first day the hemoglobin was 55 per cent; the erythrocytes, 3,450,000; the color index, 0.8; the leukocytes, 7,900; the neutrophils, 23 per cent; the small lymphocytes, 47 per cent, the large lymphocytes, 25 per cent, and the transitionals, 5 per cent. Occasional normoblasts were seen. The infant's pallor was not as noticeable. The spleen could not be palpated.

The infant continued to improve. Examination of the blood on the sixtieth day showed: hemoglobin, 60 per cent; erythrocytes, 3,750,000; color index, 0.8, and leukocytes, 9,000. On the ninety-fifth day: hemoglobin, 75 per cent; erythrocytes, 4,160,000; color index, 0.88, and leukocytes, 11,400. The differential counts that were consistent with those of a baby of this age have been omitted for the sake of brevity. Meanwhile the infant continued to thrive, and the paleness disappeared. At 4 months no abnormalities could be found. No treatment was given for anemia at any time during the period of observation.

CASE 2.—*History.*—Baby E. was first seen on Aug. 29, 1931, when she was 13 days old. She was born at full term, the second child of a healthy young mother. Pregnancy was normal, except that vomiting was rather severe during the first three months; thereafter the mother felt exceptionally well. The first child was born at full term and was normal in all respects. This baby, born at term after a normal labor, was vigorous, and nursed well after birth. Slight jaundice noticed during the first few days soon gave way to marked pallor. The stools, which were dark at first, became normally yellow after a short time. There was no hemorrhage from the umbilicus or mucous membranes.

Examination.—At the time of our first examination the baby weighed 6 pounds and 7 ounces (3,050 Gm.); nursed well, was alert, and, except for the pallor, appeared to be normal. The skin and mucous membranes were very pale, and there was a slight icteric tint to the former. The heart was not enlarged, and the valve sounds were loud and clear. The stump of the cord was still attached to the umbilicus. The liver could be felt 1.5 cm. below the costal arch. Examination of the blood at this time revealed: hemoglobin 35 per cent (Sahli); erythrocytes, 2,070,000; color index, 0.89; leukocytes, 18,200; neutrophils, 25 per cent; small mononuclears, 25 per cent; eosinophils, 2 per cent; monocytes, 7 per cent; basophils, 1 per cent; myelocytes, 5 per cent, and myeloblasts, 9 per cent. There

was slight polychromasia and moderate anisocytosis. The baby was being given a proprietary hemoglobin preparation when first seen, and this treatment was continued.

Course.—When the infant was seen the second time, three weeks later (September 19), she appeared much improved. The color was better, and she still nursed well. The weight was 8 pounds and 4 ounces (3,810 Gm.), a gain of over 1 ounce (28 Gm.) a day. The spleen was smaller but still easily palpable. Examination of the blood showed: hemoglobin, 42 per cent (Sahli); erythrocytes, 3,160,000; color index, 0.67; leukocytes, 6,000; neutrophils, 25 per cent; large mononuclears, 3 per cent; small mononuclears, 65 per cent; transitionals, 3 per cent, and normoblasts, 3 per cent. The last observation was made on October 9, at which time the general condition of the infant was excellent. The weight was 9 pounds and 5 ounces (4,330 Gm.). The spleen was barely palpable, and the liver was not enlarged. Examination of the blood showed: erythrocytes, 3,190,000; leukocytes, 8,400; neutrophils, 25 per cent; small mononuclears, 51 per cent; large mononuclears, 5 per cent, and transitionals, 8 per cent. The baby's condition appeared so satisfactory that permission was given the mother to return to her home. On December 9, the mother reported that the baby appeared to be developing normally, gaining in weight and having a good color. At this time the physician estimated the hemoglobin at 68 per cent.

COMMENT

Case 1 was of interest for several reasons. It showed characters similar to those in the case reported in 1927, namely absence of jaundice and no definite splenic enlargement, pallor being practically the only symptom, and in both instances it became apparent clinically at 10 days. The most unusual feature is the fact that this infant and the one described in 1927 were born of the same mother. The fathers were not the same. This would suggest maternal transmission of the condition. No history could be obtained of the child born between these two pregnanacies. The first report mentioned that the mother had said that pallor developed in all of her babies after birth, and with this subsequent experience we are inclined to believe her. There was no evidence that the mother's health had been affected unduly by eleven pregnanacies in fifteen years; there was no history of uterine hemorrhage, taking of drugs, insufficient food or gastro-intestinal disease; and the pregnancies, labor and puerperiums were uneventful. There were no evidences of chronic infection, poisoning or venereal disease. The untreated infant appeared normal at the age of 4 months, although handicapped by not receiving breast milk.

The second patient differed from the first chiefly in the presence of mild icterus and a palpable spleen. The infant showed no evidences of hemorrhage prior to development of the anemia, and there was nothing in the maternal history to explain it. At the end of four months, during which time a proprietary beef hemoglobin preparation

was used, the infant appeared normal. It is interesting to observe that improvement of both of these patients continued at about the same pace regardless of treatment.

Nothing in the history or findings in these two cases suggests an etiologic factor.

SUMMARY

Two cases of so-called primary anemia of the new-born are reported. One infant was the offspring of the mother of a patient with a similar condition reported in 1927, but of a different father. This would indicate maternal transmission of the condition. Examinations of the blood were made before the anemia developed and during the return to normal, a period of four months, during which time no treatment was administered. The other case differed only in the presence of icterus and a palpable spleen. Oral administration of a hemoglobin preparation did not seem to hasten recovery.

These two cases bring the total of those reported up to eighteen.[6] Fourteen others have been mentioned but not described. The etiology of primary anemia of the new-born is obscure, and so far no plausible theory of the cause has been suggested.

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6. The case of A. F. Abt (Anemia of the New Born, Am. J. Dis. Child. **43**:337 [Feb.] 1932) was reported after this article was submitted for publication.

MALIGNANT PEMPHIGUS IN A CHILD

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Some difference in opinion appears to have developed recently as to whether true pemphigus ever occurs in children. Stelwagon [1] said in his textbook that acute pemphigus is seen for the most part in children of an early age, and Pusey,[2] speaking of the unfavorable prognosis in children, mentioned the gangrenous type as the one usually seen only in children. He also stated that acute pemphigus has followed scarlet fever in children, and differentiated between pemphigus and the so-called epidemic pemphigus found in children owing to local infection with pus organisms. Walker [3] mentioned cases of acute pemphigus of the type usually found in butchers, resulting from trifling wounds, as occurring in children, and stated that one of his patients, a girl of 9 years, recovered. Sutton [4] called attention to the fact that several pathologic conditions formerly included under the heading of acute and contagious pemphigus are now generally believed to be only aberrant examples of impetigo contagiosa.

The opinion has been expressed more recently, however, that pemphigus vulgaris in its various phases, such as pemphigus acutus, pemphigus chronicus and pemphigus foliaceus, is a disease confined to adult life, and that conditions in children described as pemphigus properly belong under other headings, such as septicemia, impetigo bullosa and other diseases. Andrews [5] dismissed the question briefly by saying that "pemphigus does not occur in children."

The following case is reported as one of typical acute pemphigus occurring in a child, with no clinical or historical features that would justify classification under another heading.

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1. Stelwagon, H. W., and Gaskell: Diseases of the Skin, ed. 9, Philadelphia, W. B. Saunders Company, 1921, p. 373.

2. Pusey, W. A.: The Principles and Practice of Dermatology, ed. 4, New York, D. Appleton and Company, 1924, p. 285.

3. Walker, Sir Norman: An Introduction to Dermatology, ed. 8, Edinburgh, W. Green & Son, 1925, p. 90.

4. Sutton, R. L.: Diseases of the Skin, ed. 6, St. Louis, C. V. Mosby Company, 1926, p. 307.

5. Andrews, G. C.: Diseases of the Skin, Philadelphia, W. B. Saunders Company, 1930, p. 480.

REPORT OF CASE

Mary Y., a Chinese schoolgirl 8 years old, was first seen on Nov. 28, 1930. Her parents were in good circumstances, and her environment was in all respects similar to that of a well-to-do Canadian family. She had been vaccinated successfully four years previously, and her health had been good. She had had no previous illnesses and no injuries.

Seventy-two hours before I saw the patient, her cousin, a qualified medical practitioner, had been called to see her on account of her complaint of sore throat. He observed nothing more than some moderate redness of the fauces. Twelve hours later red spots appeared on the skin of the neck, the throat was more congested, and there were blisters in the mouth. The eruption continued to spread over the neck, face, trunk and limbs successively, and the patient's general condition became alarming.

When seen on the fourth day of her illness she was in bed at home, not lethargic or stuporous, but resisting all attempts to examine her. There had been no complaint of itching. There was intense photophobia. The oral temperature was 106 F. On the face, neck and trunk there was a profuse eruption of pigmented macules, many of which had coalesced into large patches with polycyclic margins. There were numerous flaccid blebs with clear contents varying in size from that of a large pinhead to that of a lima bean. Some of the bullae, as well as some of the vesicles in the mouth, were hemorrhagic. The eruption was more sparse on the limbs, but the largest bullae were on the ears and extremities. Many arose from apparently normal skin, with no erythematous halo. The entire buccal mucous membrane was stripped off leaving a raw surface. There were large blebs on the bulbar conjunctiva of both eyes. On the back there were large raw, moist areas. Nikolsky's sign could be elicited on almost any part, and the greatest care was necessary in examining the patient to avoid the stripping off of more epithelium. It was impossible to pull the eyelids apart to inspect the conjunctiva without this happening. There was no fetid odor noticeable at this time. There were no purulent lesions.

The child was immediately removed to the hospital. All nourishment and fluids were refused, and there was no response to treatment with topical remedies, colonic lavage and intravenous injections of saline solution with coagulen. The patient complained of abdominal discomfort, and semiliquid stools were passed. She became irrational a few hours after admission, and the temperature remained above 105 F. by mouth. Prostration was not a marked feature.

Death occurred thirty hours after admission to the hospital, less than five days after the first complaint of sore throat. Blood cultures were negative. Autopsy was not permitted.

SUMMARY

True pemphigus is generally considered to be rare in childhood.

A case of pemphigus, fulminating and terminating in death within five days from the onset of symptoms, and justifying the qualification malignant, is reported in a child 8 years old.

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Progress in Pediatrics

HEREDITY AND THE CONSTITUTION OF THE CHILD

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An expression that one often hears from the physician is that some special condition or manifestation is constitutional, in the sense of fundamental in nature, instead of being the result of some more or less immediate environmental occurrence. The suggestion has come to me that the members of an organization such as the American Pediatric Society, devoted primarily to the ills of childhood, might be interested in the biologist's conception of this fundamental nature of the child.

Since living organisms invariably arise as the offspring of preexisting living organisms of the same kind, it is obvious that if a particular living creature is human, it is because his ancestors were human. He is Anglo-Saxon or Scandinavian or Mongolian because of parentage, and furthermore, he has many characteristics of mind and body that are recognized as family traits. Not only general features and structures, but minute physical defects, mental peculiarities and even personal mannerisms often reappear because of the hereditary relation between the existing individual and his progenitors. Thus heredity is an outstandingly important item in the constitution of the child.

WHAT THE CHILD INHERITS

What the child inherits, however, is not a series of finished traits or characteristics but a multitude of determining substances called genes which must interact and cooperate in innumerable complex ways before what one ordinarily thinks of as the inherited trait emerges. The developing organism is, in fact, an intricate reaction system, and a particular "character" in its finished form may be more or less the product of the whole germinal complex.

The germ cells—ovum and spermatozoon—are undeniably in some way the conveyors of the hereditary qualities or tendencies which find

Address (illustrated) given at the Forty-Fourth Annual Meeting of the American Pediatric Society, the Mayo Clinic, Rochester, Minn., May 27, 1932.

expression in the visible, orderly sequences followed by the individual in its development. To learn anything about the structural arrangement of the hereditary mechanism, therefore, one must penetrate into the intricate structures of the cell itself. Without going into the technicalities of the matter, I shall merely state that in the chromosomes —small, though definitely organized and enormously complex, bodies present in the nuclei of cells—has been found a mechanism which answers all the requirements for the physical transmission of such unitary substances as those which underlie what is commonly termed alternate or mendelian inheritance.

Since all other cells no less than the germ cells are descended by a process of division from the original fertilized egg cell, the nucleus of each cell of the body contains these representative structures. The elaborate mechanism by which cell division is accomplished in embryogeny, moreover, insures that a sample of every part of each chromosome is handed on to the new cells as they are formed. Tissue cells, then, as well as germ cells, probably contain in the chromosomes of their nuclei representative particles of each hereditary factor present in the nucleus of the fertilized ovum from which the animal came. It is no more astonishing, therefore, that isolated parts of a developing embryo or even fragments of an adult may sometimes rebuild the entire creature, than that the original ovum should in the first place transform into it. All the necessary hereditary potencies are present in either case.

SEGREGATIONS AND RECOMBINATIONS OF HEREDITARY TRAITS

Although in man the spermatozoon is only about one thirty-five thousandth the size of the egg, nevertheless it contributes the same number of chromosomes, of the same sizes and shapes, that the egg does. And the resulting individual, in consequence, displays as many traits of paternal as of maternal origin. Every cell of the new body thus harbors two sets of chromosomes. Through a remarkable procedure in the germ cells, however, shortly before they are ready to function, what is known as a reduction division occurs whereby the resulting functional germ, whether it is sperm or ovum, retains but a single set, containing one of each kind of chromosome. The individual chromosomes of any given set, however, are indiscriminately from the original maternal or paternal source. Such a separation of corresponding chromosomes, and their new associations at the time of fertilization, afford a ready means of accomplishing the segregations and recombinations of the hereditary traits so much discussed in modern genetics.

Geneticists and cytologists, however, are now not only referring hereditary traits to the chromosomes in general, but are also identifying certain traits with particular chromosomes. They find whole blocks of

hereditary characters which enter together into a new individual and which segregate out in the next generation in the same associated form, as if they all rode in the same wagon, and there is good evidence, both cytologic and genetic, for believing that the vehicle for each such block of characters is a single chromosome. There are as many and no more such groups of linked characters as there are pairs of chromosomes. Since one member of such a pair of chromosomes is known to be of maternal and the other of paternal origin, and as they separate in the reduction division, one going to one germ cell, and the other to another, it is easily conceivable how such groups of characters are shunted to and fro. There is good evidence indeed that not only does each chromosome contain a series of different particles related in some way to hereditary characters, but that these representatives, or genes, as they are called, are linearly arranged in the chromosome and that normally they retain the same serial order. Also, Professor Morgan and his collaborators are successfully mapping the individual chromosomes of the fruit-fly, Drosophila, and telling where, relatively, the genes of certain characters are located in each respective chromosome.

I may seem to be getting far afield from my original objective, the constitution of the child, but if one is to understand the nature of man's heredity and the origin and behavior of some of his peculiarities, there is no other way than through an understanding of the genetic system and its method of operation.

PAIRED ARRANGEMENT OF GENES

Not only are the corresponding chromosomes derived from each parent similar in general size and structure, but the constituent genes themselves are paired; that is, each gene of one of a pair of chromosomes is matched by a corresponding gene in the other chromosome, and as they are arranged in consecutive order, each occupies an invariable place in its chromosome. Each gene of a matched pair, however, has the same general function in development. Since each different kind of gene is a distinctive substance which plays its own particular part in the construction of the individual, it is obvious that if it becomes altered or destroyed, development must to that extent become modified and the resulting individual correspondingly changed.

Fortunately, each parent gives a complete set of genes, so that the chances are that if some particular gene from one parent is defective, it is likely to be offset by a normal gene from the other parent. This paired arrangement of the genes must be constantly kept in mind, otherwise much in the behavior of hereditary traits will appear to be meaningless. Dual parentage is in effect a sort of insurance scheme, for although gene defects in human beings are very common, the individual

often escapes the evil consequences because the corresponding gene is normal and is sufficient in itself to produce a normal outcome. Sometimes, however, such dominance is incomplete, and in relatively rare cases, as in brachydactylia, pigmentary degeneration of the retina or in Huntington's chorea, for example, the defective gene may dominate. If both genes of a given pair are defective—a not uncommon occurrence—then the resulting individual will manifest defect in that function or feature to which the genes in question are antecedent. Such failure, in some degree, in pairs of genes—one from the father, the other from the mother—is apparently what is back of the hereditary forms of such maladies as feeblemindedness, various insanities, albinism and many predispositional conditions, to mention only a few. Not all such recessive traits, however, are defects, since blue eye color, fair skin, blond hair and many other normal attributes come in the same category. Furthermore, it should be said that the conditions back of such maladies as feeblemindedness and others which involve different levels of intellect are probably more or less dependent on the concurrent action of many genes. As in the fruit-fly, a change in any one of fifty known genes which take part in the production of eye color, will alter the color, it is evident that in man many physical and mental features may likewise be made defective by adverse changes in any of the many genes which cooperate to produce them. Thus in some feebleminded persons the deficiency may be due to defect in one pair of genes; in others, to defect in a different pair. And it is conceivable, indeed, that out of two such stocks, normal-minded offspring might result, because the particular defective genes of the one line might be offset by normal genes from the other. It is obvious that in closely related parents, chromosomes with defects in the same genes are more likely to be brought together.

CHILDREN OF SAME PARENTS UNLIKE BECAUSE OF RANDOM ASSORTMENT OF GENES

Another matter that must be kept in mind, in attempting to comprehend the chromosomal basis of heredity, is that because of the random assortment of the respective members of the pairs of chromosomes in the reduction divisions, and their chance recombination at the later period of fertilization, there is scarcely the remotest possibility that any two children of the same parents, except duplicate twins which come from the same fertile ovum, will have the same chromosomal complex. Thus, for instance, if the chromosomes of a given individual are arbitrarily represented by *ABC abc*, and *A, B* and *C* regarded as of paternal and *a, b* and *c* as of maternal origin, then in synapsis only *A* and *a* can pair together, *B* and *b*, and *C* and *c*, but each pair operates independently of the other, so that in the ensuing reduction division either member of a

pair may get into a cell with either member of the other pairs. That is, the line-up for division at a given reduction might be any one of the following, $\frac{ABC}{abc}$, $\frac{ABc}{abC}$, $\frac{Abc}{aBC}$, and $\frac{AbC}{aBc}$. This would yield the following eight kinds of gametes, *ABC, abc, ABc, abC, Abc, aBC, AbC* and *aBc*, each bearing one of each kind of chromosome required to cover the entire field of characters necessary to a complete organism. Since each sex would be equally likely to have these eight types of gametes, the possible number of combinations from such germ cells would be 8×8, or 64.

In man, where there are twenty-four pairs of chromosomes, the number of different combinations producible would be 281, 474, 976, 710, 656. It is no wonder, then, that children in the same family may differ in appearance or in native ability. The random assortment of chromosomes explains why sometimes one may find an individual of surprising ability springing from two mediocre or even inferior strains, and why, on the contrary, one not infrequently finds dull or even defective children appearing in superior family stocks. It is likewise evident, however, that superior children are far more likely to be born of matings between ancestries which for generations have shown high ability than from strains which have been characterized by general decadence or specific defects.

As a matter of fact, modern man is passing to and fro in genetic relations the same fundamental forty-eight chromosomes which characterized the human species at its dawn. The innumerable hereditary differences which exist between races or individuals must, therefore, be the result of constitutional changes which have taken place in the various genes of these chromosomes. It is evident that once a constitutional change occurs in any chromosome, as a result of sexual reproduction it eventually becomes instilled into the race or stock. Constant novelty is thus being introduced and spread by means of chromosome recombinations generation after generation, thereby making for greater diversity in offspring. It is probable, however, that, in a closely related stock at least, much of the substance of any particular chromosome in an individual is a duplicate of that of the corresponding chromosome in a fellow individual. The differences which creep in from time to time apparently represent restricted regions rather than the entire chromosome. It is not improbable, indeed, that the fundamental constitution of each of the twenty-four kinds of chromosomes in man is similar in many respects in all human beings.

While most people trained in medicine or biology have some knowledge of the mendelian principles of heredity as rediscovered about 1900, those who are not constantly on the firing line of the new science of genetics are likely not to have realized the increasing complexity in this

field. The restrictions or the elaborations that more recent knowledge makes necessary, however, in no wise nullify Mendel's original discoveries of the unitary basis of inheritable characteristics and of the independence in heredity of alternate characters. The matters of dominence or recessiveness, or of the various degrees of intermediary which may sometimes exist, while often of great practical importance, are really of secondary significance to the fundamental discovery that hereditary characteristics are represented in germ cells by relatively independent, self-perpetuating particles, associated groups of which, in the form of chromosomes, can separate from one another and recombine in such ways that the expressed characters which they represent can be removed from one strain and introduced into another.

FACTORIAL INTERACTION; MULTIPLE GENES AND MODIFYING FACTORS

It is not surprising that those who have not kept close watch on the modern advances in genetics are a bit bewildered by the present day situation. In the first place it must be realized that the visible character differences studied in genetics are really the outcome of factor differences in the germ. Materially considered, these germinal differential causes which are called genes are separate chemical substances which interact and cooperate in the establishment of the various parts or traits of the organism. One thinks of a single gene as identified with any specific hereditary character only so far as, in genetic analysis, one finds unitary modifications in the body can be referred to single factor differences in the germ. It is important to remember also that various recessive genes may be unexpressed for one or more generations and thus become manifest only in later descendants. Any particular gene, furthermore, may be of significance in connection with many other features of the organism than the one with which it happens to be identified. On the other hand, any expressed character is, as has been seen, probably the product of many genes, a change in any one of which would also mean a change in the character. Moreover, sometimes a given character may be determined by any one of several separate genes. At least three races of white fowls are known, for instance, in which the whiteness is due to entirely different genes. Such conditions as feeblemindedness in man are complicated not only by the fact that the deficiency, when inheritable, is not always due to the same defective gene, but may also result from adverse environmental influences. If one or more of a great number of units which are necessary for complete mental development are lacking, obviously mental deficiency will result. In other words, feeblemindedness and allied disorders may not be definite characters, but simply evidences of the fact that the nervous system has not developed all factors necessary for normal mental

capacity. Again, what at first sight appears to be a pair of alternate mendelian characters may in reality not be. Also, characters are known which require for their production the combination of two or more dissimilar factors. A multitude of independently heritable modifiers have been found to exist, moreover, changes in which will make a difference in the outcome of a central or more fundamental gene. Then, too, multiple genes for a character may exist, any one of which can produce the character, but which when combined produce it in a more pronounced form, as happens in the pigmentation of the Negro skin. Thus, as knowledge of genetics has advanced, many complications of the simpler mendelian ratios have been encountered in the form of what at first sight appear to be numerical discrepancies, yet which when rightly interpreted fall into line with the general conception of unitary genes and factorial interaction.

FUNDAMENTAL FACTORS IN EMBRYONAL DEVELOPMENT

So much for the germinal basis of the child's constitution! The developmental aspect will be considered next. In the early embryologic investigations in which observation without experiment was the method in vogue, one became accustomed to regard the visible sequence of parts and the progressive cell restrictions which occur as the inalterable, predestined outcome of development. In the later eighties, when experimentation as well as observation was inaugurated in embryology, it was discovered that a very considerable generative power had been overlooked which still lurks in cells that in the common order of things have taken on the special duties of their particular location in the individual of which they constitute a part. The cells of plants and of lower animals particularly seem to be, as it were, protoplasmic Jacks-of-all-trades, and even with the advanced cellular specialization of the higher vertebrates, including man, a certain versatility of the individual cell is under some conditions still in evidence.

Such discoveries open up the all important question of how much the newly developed creature is really a result of specific, preformed substances in the egg, and how much the outcome of influences imposed from without. It is obvious at least that as the new being is built up through a series of cell divisions, its various parts could not have been contained in miniature in the egg in the crude way the early preformationists believed, and it is equally evident that the germ cannot be a formless unorganized mass.

The problem is extremely complex. Many points are not yet known. That there are special determining factors present in the germ is certainly evidenced by the fact that one may take two eggs which look alike and put them into an aquarium of seawater so that they will develop

under the same conditions; yet one will produce a backboned animal and the other an invertebrate. The egg of a bird can never give rise to a frog no matter what external conditions prevail, because the egg of the bird is not of the same organic composition as the frog's egg to begin with. That the potentia of the characteristics of the adult are in some way existent in the germ cannot be gainsaid; but, in what form? How are they released or expressed? Various biologists have concentrated their attention on this problem in recent years, and although a complete solution has not yet been arrived at, many interesting and significant facts have been disclosed.

Broadly speaking, four factors of fundamental importance are involved. These are: (1) the nature of the primitive stuffs of which the germ is composed; (2) the influence of the external conditions which are called environment; (3) the chemical, mechanical or other influences exerted by some parts of the developing body on others, and (4) the stage of development at which a stimulus acts.

The third factor is reducible to special phases of the others, but as there are indications that the normal growth of each tissue or organ is probably controlled by one or more specific internal secretions from other tissues or organs—producing their effect, in part at least, by inhibiting or accelerating the development of the given part—it is perhaps well for purposes of description to regard such influences as a distinct set of factors.

Slight variations in external conditions are constantly occurring, and since they produce no appreciable effect on the developing form, they are to be regarded as part of the normal environment. It has been found, however, that pronounced alterations of such extrinsic factors, as temperature, pressure, gravity, light, moisture or chemical constitution of the surrounding medium, may affect development either generally or specifically, not infrequently producing monstrosities. On the other hand, a very slight alteration of the internal conditions will in all probability produce a marked effect.

ARE THE PARTS OF THE ANIMAL PREDETERMINED IN THE GERM?

The results of interference with normal conditions of environment can easily be demonstrated by actual examples. Sea water lacking one of the three elements, sodium, calcium or potassium, tends to make the early cleavage cells of the eggs of various marine organisms fall apart; certain acids do the same. The result may also be accomplished by shaking and by other mechanical means. Such isolated blastomeres, if placed in normal sea water, may continue to develop. It has been found that, as extremes, there are two types of behavior. In the one type each blastomere gives rise to a complete new organism; in the other only to a

part of one. In the development of amphioxus, a small primitive vertebrate-like form, for example, the early blastomeres, if separated, will each give rise to a normal, though proportionately smaller, embryo. That is, what is destined normally to produce one individual can be made to give rise to two or even more. In some jellyfish each cell of the sixteen cell stage may thus be made to develop into a perfect, though dwarfed, embryo. In such cases, at least, the blastomeres are equivalent in their potentialities during early cleavage.

On the other hand, the cleavage planes may follow with surprising accuracy along predetermined paths so that each blastomere has definite characteristics and is destined to produce only certain tissues of the embryo. In the tunicate, Styela, for example, Professor Conklin has shown that if one or more blastomeres of the two cell or four cell stage are injured so as to prevent their further development, the remaining blastomeres develop as usual, giving rise only to the special group of tissue cells they would have produced had the destroyed cells remained in place in a normally developed embryo. The two different conditions are spoken of as the result of indeterminate and determinate cleavage, respectively. In the indeterminate form all blastomeres up to a certain point of development are of equal value among themselves, and they differ from the original ovum, not as regards specific or related parts but only in amount of substance, so that any one of them can give rise to a new individual. In the determinate form, on the contrary, specialized egg substances outside the nucleus exist apparently from the first, and seem to be so arranged that the first cleavage plane cuts off materials in one blastomere that are not present in the other. As a matter of fact, the two types of cleavage are not absolutely distinct from one another, because intergrading forms in all degrees are known. The whole question seems to be one of the relative time at which specialized substances are formed in the cytoplasm of the germ cell or early blastomeres, or at least of the time such substances are segregated in cell division.

In some cases, however, a blastomere that under certain conditions gives rise to only a half embryo may under other circumstances produce a complete embryo, thus showing that it still contained all the essential ingredients. If one of the first two blastomeres of a frog's egg is destroyed, for example, the remaining one, provided it lives and remains undisturbed, develops into a half embryo. But if the injured blastomere is cut completely away instead of being killed and left in place, a rearrangement of the contents of the remaining blastomere occurs and a small normal embryo subsequently develops. The significant thing is that even in cells which have undergone a certain degree of particularization toward building a special part of the body there still reside all the potencies required to form the complete organism.

ORIGIN OF DUPLICATE HUMAN TWINS

In man the evidence indicates that cleavage is indeterminate. It is possible that identical or duplicate twins originate as blastomeres which have separated in early cleavage and developed independently, or the divorcement may have come later through the suppression of the original axis of development and the establishment of a new one on each side of it.

Incomplete separation of blastomeres usually results in the formation of double monsters. The same condition can be produced by so treating the developing form that two axes of development instead of one are established. For example, by keeping the two cell stage of the frog upside down, such monstrosities, of varying degrees of duality, may be obtained. The same effect has been produced in the case of certain salamanders by tying a hair around the developing mass. Since in man there are many cases on record of dual monsters of different degrees of completeness, from two-headed forms to two almost complete individuals, as well as individuals joined to one another in various positions, it seems plausible to suppose that factors similar to some of the foregoing have contributed to their production.

Since in recent studies of human genetics so much has been made of the inheritance of duplicate or identical twins as compared with that of ordinary fraternal twins, it is well, perhaps, to examine their condition a little more in detail.

VALUE OF TWINS IN THE STUDY OF HUMAN GENETICS

In comparisons of identical twins with ordinary twins, one has perhaps the best means of any yet found for gaining knowledge of the relative potencies of heredity and environment. Identical twins, since presumably they come from the same fertilized ovum and therefore have duplicate chromosomes, are two individuals with identical heredity, whereas ordinary or fraternal twins are merely two individuals born at the same time of the same parents. The effects of different environments on identical twins and of the same environment on ordinary twins should show what power environment has to modify the inborn characters of individuals.

In brief, most studies made on identical twins agree in finding them remarkably prone to remain much alike in spite of all differences in environment. They are always of the same sex. They tend, in general, to develop the same traits and continue to be of the same mental or mechanical ability; they usually have the same appetite for foods, and they often show the same idiosyncrasies toward certain foods. Cases are on record, even, where such twins have developed the same insanities at about the same time. However, a few instances are known in

which supposedly identical twins reared apart from infancy have come to show a considerable degree of intellectual and emotional disparity. In such individuals the emotional nature has appeared to be more susceptible to the shaping influence of surroundings than the intellect.

Fraternal twins, on the other hand, are no more alike than ordinary brothers and sisters. They continue to maintain their differences when reared under the same conditions, instead of becoming progressively similar, as they should, if environment were the main factor in development.

Coming from the same ovum, identical twins usually though not invariably are encased in the same fetal membranes, while ordinary twins occur in separate sets of membranes. From an examination of the placentas and membranes in 1,157 twin births, Alfehld estimates that about 16 per cent of twins are of the identical type.

CONJOINED TWINS LESS ALIKE THAN SEPARATE IDENTICAL TWINS

While ordinarily one thinks of twins from the same ovum as of the separate identical twin type, it is evident that conjoined twins of the Siamese kind are also of such monozygotic origin. A number of such conjoined twins have been studied recently. At first thought one might expect such twins to be even more alike than separate identical twins, but the fact is that they are less so. A pair of such conjoined twins from the Philippine Islands, who recently toured the United States, are distinctly unlike in certain respects. The right-hand member of the pair is heavier, has a larger and broader skull and a forehead of different shape. These conjoined twins are less alike than are their wives, who are separate identical twins.

A disparity in size is apparently the usual condition in conjoined twins. Newman points out that in all four of these cases about which there is accurate information on this point, the right-hand twin has the larger head and face. Noticeable differences in facial characters and expression and even in intelligence have been observed in such twins. In the Blazek twins, Josepha, the right-hand twin, was much the better developed of the two. She bore a normal son. The other twin, Rosa, had rudimentary genitalia. In the majority of cases, according to Newman, even when the identical twins are complete, separate individuals, the more right-handed one of the pair has the larger head, and he believes that the evidence from conjoined twins indicates that such a right-handed, free twin was derived from the right half of the original embryo.

Mirror-imaging, as, for example, the right hand is a reverse image of the left, is supposed to be common in duplicate twins, but in his studies of fifty pairs of such identical twins, Newman found but little

of it in the most strikingly similar pairs. Such obvious kinds of mirror-imaging as left-handedness or counter-clockwise hair-whorl in one twin of a pair, he found commonly in the less similar pairs. In conjoined twins, however, the most extensive asymmetry reversals known in twins seemed to occur, extending even to cases of visceral reversal.

Newman proffers the explanation that twins which separate early, before the anteroposterior axis of the embryo is established, show the greatest amount of similarity, while those which separate late in development, after the two sides of the embryo have become asymmetrically differentiated, are less alike and commonly show mirror-imaging. In other words, in the latter, one component is what is essentially the equivalent of the right side of a body and the other, the left side. When twinning comes very late, as it probably does in conjoined twins, reversals of symmetry are particularly likely to occur.

It seems to be the general rule in bilaterally symmetrical animals that if the original axis of growth is caused to slow down, as may be done by any of several well known physical or chemical means, new axes arise on either side of the old one. Apparently, competitive processes are at work in the developing animal comparable to those in a plant stem which keep the side buds of a twig quiescent as long as the terminal bud is growing vigorously, but which on the removal or injury of this bud permit the lateral buds to spring into growth. In fish Stockard finds that the degree of separation of the two components of double monsters depends on how far apart the two new growth points arise in the ringlike region (germ-ring) of greatest formative activity. He has secured graded series of fish ranging from individuals with slightly separated heads on single bodies, through specimens with two bodies and common tail, to completely separated twins.

When one of the originating buds chances to be more favorably located than the other, however, it grows at a normal rate and develops normally, while the less favored one grows more slowly and always develops abnormally. The latter shows deformities in direct proportion to its degree of suppression. Such structural reactions seem to be universal among developing vertebrates.

CRITICAL STAGES IN DEVELOPMENT

Retardation in the rate of development is also probably responsible for numerous deformities which may arise in single embryos. Applied at a very early period of embryology, the harmful influence may, as just seen, cause the formation of twins and double individuals; applied slightly later, double individuals are never produced, but various abnormalities of the eyes are the prevailing defects; still later, gross deformities of the eye do not result, but some other actively developing organ

is the part affected. Thus the particular developmental periods have been determined during which such organs as the heart and blood vessels, the mouth, the gills and the liver may be greatly modified or suppressed. The most sensitive period is very close to the actual moment of origin of the organ in question. As the same type of defect may be produced by any one of a number of different chemical or physical means, it is clear that it is not a specific agent which causes the response, but merely an adverse influence applied at a critical stage in development.

That man is subject to similar vicissitudes goes without saying. And probably the most important crises in his development come long before birth. When one thinks of how enormously greater the developmental distance is from the single-celled ovum, only about $\frac{1}{125}$ of an inch in diameter, to the new-born child of 7 pounds (3.2 Kg.), than that from such an infant to a 150 pound (68 Kg.) man, one can appreciate the fact that most organic deformities and constitutional deficiencies are inaugurated in early embryonic life.

FUNCTIONAL DIFFERENTIATION OF A PART IN EARLY EMBRYO CONDITIONED BY SURROUNDING PARTS

Not only is the stage at which a modifying stimulus acts an important factor in development, but it is a well established fact that the development of one part may profoundly modify that of others. For example, the sensory parts of the eye originate as a pair of bulblike optic vesicles from the sides of the brain. As each optic vesicle develops it becomes marked off from the brain by means of a definite stalk, and through elongation of this stalk the bulb soon comes into contact with the external ectoderm of the embryo. At the point of contact the ectoderm thickens to form the crystalline lens of the eye. Although a lens may sometimes form, if by any means the optic vesicle is prevented from touching the ectoderm, it frequently will not. Experiments in certain amphibians show that if the optic vesicle is transplanted beneath the ectoderm at another place in the embryo, notably in the region of the head, so specific is this lens-forming stimulus of the vesicle, that the ectoderm which comes into contact with it forms a definite lens. In other words, epidermis that does not normally give rise to lens will do so if brought into contact with the optic vesicle. Such an experiment raises anew the question of how much an organ which develops in a given region of an animal is a self-differentiating structure, how much it owes its occurrence to contact and other stimuli.

There is much evidence indeed that what the very early cells of an embryo become depends not merely on the genes within the cell itself but on its relation to the other cells of the embryo and other

surrounding conditions. In the blastular stage of such a form as the frog, for example, one can point out just which cells under ordinary conditions of development will produce the brain, which the eyes, the spinal cord, the skin, the digestive tract and other parts. The fate of every cell seems fixed. But this is far from true. If, in this early embryonic condition, a part that was to become brain is exchanged by transplantation for a part that was to become skin, then under the new influence of what the cells about them are becoming, the transplanted cells change their course, and what was prospective skin becomes part of the brain and the cells from the incipient brain become skin. Mangold showed still further that early ectoderm which unmolested would give rise to epidermis or medullary plate could if transplanted into a proper region be made to differentiate into muscle segments, embryonic kidney or intestinal wall, that is, parts appropriate for the new region, which normally come from endoderm or mesoderm. These facts are equally true if the exchanges are carried out between the embryos of different related species. Nevertheless, under such circumstances there remains an interesting bit of specificity. When Spemann exchanged what would have become an eye in the salamander Triton taeniatus with presumptive gill tissue from the species Triton cristatus, each transplant differentiated in accordance with its new location—that is, presumptive gill tissue into eye and presumptive eye tissue into gill—but each retained its species characteristics; external gill stumps which developed on T. cristatus resembled those of the species T. taeniatus, while the gill tissue which became eye when transplanted to T. taeniatus was eye tissue of the kind found in T. cristatus. In other words, although the new environment could determine the functional differentiation of the part, it could not change the inherent nature of the cells based on their genetic constitution.

ORGANIZERS

At a slightly later time, with the coming of gastrulation and the formation of ectoderm and endoderm, the situation becomes wholly changed. The dorsal lip of the blastopore becomes a center of differentiating influence. To cells such as those of this region, Spemann has applied the term "organizers." From this center some kind of a developmental impulse passes forward and spreads laterally in such a way that the cells in the line of influence transform into spinal cord, medulla and the various other regions of the brain, the eyes, and other parts, in their proper positions. If such transplants as those just described are now made, each transplant develops according to its place of origin; it is no longer redirected by the new environment. A prospective eye vesicle transplanted into the epidermis of a similar embryo,

instead of conforming to functional proprieties of the new environment, goes ahead and develops into an eye vesicle. But again, if developing eyes are interchanged between two species of different size, each transplanted eye grows according to the size of its own species and not that of the host species.

If a piece of the dorsal lip of the blastopore containing the so-called organizers is transplanted from the embryo of one species of salamander into the general surface ectoderm of another species in the same stage of development, instead of becoming like the neighboring cells, the transplant shapes them toward its own developmental ends and may, together with them, form a new embryo on the body of the host. In Mangold's most successful experiment the new embryo arising from such a transplant had notochord, mesoblastic somites, wolffian ducts, central nervous system and auditory vesicles, but was deficient in the anterior cephalic region. The new or parasitic embryo was thus composed of a mixture of cells of the two different species of salamander; but again, the transplanted cells retained the characteristics of the species from which they were taken. It is evident that under the new conditions such cells are no longer dominated by the strange environment. On the contrary, they bear some power within themselves which determines not only their own direction of development but that of the adjacent cells of the host which come within their range of influence—an exact reversal of the earlier state of affairs.

Geinitz found that a piece of the dorsal edge of the blastoporal region of a salamander gastrula, when introduced into the cleavage cavity of another embryo, induced the formation of a new embryonic body within the host. Since transplanted ectoderm from other regions did not do so, it is evident that the differentiating power resided in some way in the implanted organizer. As Spemann has pointed out, the roof of the archenteron or embryonic intestine is a particularly important organizer in determining the development of the central nervous system. Other, secondary, organizers are also known and, furthermore, once the organizing effects have been set up in a particular embryonic part, they may be further transferred by transplantation to still other embryos.

Whether such an organizer operates as an activating stuff after the fashion of hormones is not known, but the analogy is certainly suggestive. In this connection it may be well to cite some recent experiments of Witschi with parabiotic grafts. Burns showed that if salamander tadpoles are grafted together in pairs, when the individuals happen to be of different sex, the sex hormones of the one are likely to alter the sexual system of the other. Witschi found, however, in a similar series of experiments, that this was true only when the individuals were so united that the two gonadic systems were near one

another. When the systems were widely separated, if the tadpoles were of different sex, each developed its own type of gonads. Witschi has pointed out the similarity between this effect and that produced by organizers.

INTERNAL SECRETIONS AS FACTORS IN DEVELOPMENT

This brings up the whole question of internal secretions as factors in development. It is a familiar fact, of course, that many physical and even mental abnormalities in man are being traced to deficiencies of the endocrine glands, or to upsets of their normal interrelations. Atrophy or hypertrophy of such a gland may produce profound effects in the furthermost reaches of the body. Height, broad or slender form, length of arms and legs, shape of face, quality of voice, distribution of hair or of fat on the body, and even emotions are in greater or less measure conditioned by the relative functionings of the various endocrine glands during earlier development and later life. And there is no reason to doubt that the amount and quality of the secretions in various family strains are as much the expression of hereditary factors as are many other individual characteristics. The hereditary aspect of these glands, however, is likely to be overlooked, because they are also subject to environmental modifications, and because one is accustomed to think of them in terms of their immediate activities instead of their genetic constitutions.

The results of Stockard's experiments in crossing various breeds of dogs demonstrates rather clearly, it seems to me, that the causes lying back of certain freakish types of development, depending apparently on the relative activities of various endocrine glands, are really based on genetic factors which affect these glands. Since similar anomalies occur in man, in him likewise the underlying causes are doubtless genetic in nature. The disproportionately broad face, low nose-bridge, overhanging forehead and undershot jaw of the achondroplastic dwarf—due mechanically probably to lack of growth of the skull base—apparently is closely parallel to the condition which produces the bulldog or pugdog type of face. The short and somewhat twisted arms and legs also suggest the somewhat similar condition found in the bulldog. The bulldog apparently owes its grotesque appearance to defective internal secretions, but these deficiencies are probably due primarily to inheritance of abnormalities in the endocrine glands themselves.

Stockard has shown that the short-bent, achrondroplastic type of legs found in such dogs as the basset hound or the dachshund, associated here with normal body and normal head, is inherited as a dominant trait. The hybrid offspring between a German shepherd

dog which has normal length of legs and a basset hound, for example, are all short-legged, although not so short as the basset parent. When these hybrids are interbred, the F_2 generation contains individuals with the very short basset type of legs, others with the intermediate type of legs and some with the recessive long type which characterizes the shepherd grandparent. All genetic tests such as back-crossing the F_1 individuals with the parent types clearly demonstrate the hereditary nature of the conditions.

Crosses between the dachshund which has normal head, body and tail, but very short legs, with such a form as the Boston terrier with bulldog face, twisted tail and defective sacrum, though with long, well developed legs, showed that such localized dwarfed and shortened parts are all independently inheritable, so that by the third generation they may be obtained in all possible combinations.

Among dog giant types it was found that when the great Dane, a simple, well proportioned giant type, was crossed with a St. Bernard dog, which is an acromegalic giant type, the offspring developed varying degrees of the St. Bernard overgrowth after five months. Curiously, the hybrid puppies, shortly after three months of age, developed paralysis of the hindlegs. The condition lasted as a complete paralysis for from a few days to several weeks. Though the animals later learned to walk after a fashion, the muscles involved were never restored. A similar paralysis occurs rarely in the great Dane breed and is occasionally found in certain strains of the St. Bernard. The combination of the two breeds apparently accentuates the condition to universal occurrence in the hybrids. The back-cross of such hybrids with the St. Bernard again gives this paralysis and atrophy of the thigh musculature.

As to the personal peculiarities, both mental and physical, associated with constitutional differences in the endocrine glands, these are as obvious in man as in dogs and many of them are very similar in type.

CONCLUSIONS

From the foregoing facts it is evident that both distinctive original stuffs must be present in the egg and a favoring environment must prevail if the processes of cell division, differentiation, form regulation and growth, which constitute embryonal development, are to culminate in a normal adult. It seems probable that in most eggs, under normal conditions of development, a given part has a prospective relation to specific parts of the developed organism, but that this prospective outcome is not unalterable. It is prospective only in the sense that it constitutes part of a particular internal organization which, subject

to the operation of certain external factors which constitute the ordinary environment, will give rise to a normally developed individual.

In regeneration or regulation, whether it is merely restoration of a lost appendage or the development of a complete body from a fragment of an old one, the phenomenon is obviously the same as that of the more ordinary phenomenon of development. For whether the case is one of development from the egg, of budding or fission or of restitution, the problem is that of explaining the genesis of distinctive organs and attributes from a fundamental protoplasmic mass of definite and specific constitution and ancestry. While external agents may be of great importance as stimuli, and while unquestionably environment restricts or conditions and sometimes markedly modifies the outcome, the nature of the response is determined by the inherited organization of the developing form. Specific forms, then, though they may be greatly modified by external conditions, are not caused by them.

Where, then, is one left with the problem of the constitution of the child? It is evident that the child is neither solely the expression of its inheritance nor the mere chance product of its environment. Both are necessary and must work hand in hand. Dormant capacities must have proper environment to call them forth, but, on the other hand, no kind of environment can evoke responses if some degree of aptitude is not present. Development is a complex reaction between inherent organization and environment, with organization the predominant, specific factor, and environment a generally directive or permissive factor. While one cannot ignore the impresses environment may have left on the individual during the vicissitudes of prenatal development and early life, child constitution as it stands at any time, with its abilities and disabilities, its strengths and weaknesses, its susceptibilities and its resistances, is fundamentally the outcome of hereditary trends and potentialities.

VITAMIN D

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"There are at least thirty-seven individual substances essential for a complete diet. These consist of amino-acids (derived from proteins), linoleic acid, dextrose, minerals and vitamins. An adequate supply of all these substances is absolutely essential for life." The foregoing significant statement was made by Prof. E. V. McCollum of Johns Hopkins University at an interesting conference of nutritionists held in New York City, on April 16, 1932.

During the past ten years the world has become vitamin conscious. Much has been said and written in regard to vitamins, and perhaps no one vitamin has been singled out for such marked attention as has vitamin D.

At the meeting mentioned particular attention was given to a thorough discussion of present day knowledge regarding this vitamin. Among those participating in the discussion were Profs. Lafayette B. Mendel and Grover Powers of Yale University, Profs. E. A. Park and E. V. McCollum of Johns Hopkins University, Prof. Clifford G. Grulee of Chicago and myself. The following is a résumé of the discussion:

One of the rôles of vitamin D is the promotion of optimal utilization of calcium and phosphorus, particularly to form the skeletal and dental structures. This does not imply that one can neglect the provision of a liberal intake of calcium and phosphorus. An adequate amount of these minerals, as supplied by one and one-half or two pints of milk daily, is most important, but the harmful effect of deviations from the optimal intake and balance of these elements can be corrected, to some extent, by the action of vitamin D. The need of vitamin D is most evident during infancy, when a lack of this vitamin results in the development of such diseases as rickets and tetany, sometimes in spite of an intake of one quart of milk daily. The amount of vitamin D necessary for optimal health decreases somewhat as the age of the person increases. Whereas it is generally agreed that infants need the vitamin D equivalent to three drachms of standard cod liver oil daily, a somewhat smaller amount seems to be sufficient to cover the requirements during adult years.

During periods of pregnancy and lactation extra stress is placed on the calcium and phosphorus metabolism of the maternal organism. At these periods it is particularly necessary for the diet to be adequate, not only in calcium and phosphorus, but also in vitamin D, in order to insure the optimal utilization of these mineral elements by the mother.

Recent experimental work has shown that dental caries can be produced experimentally in animals by a diet inadequate in phosphorus and vitamin D, and, conversely, that the incidence of dental caries can be diminished by an adequate supply of phosphorus and vitamin D. From this it would appear that care should be exercised to assure an adequate supply of both phosphorus and vitamin D during the age periods at which dental caries is prevalent.

As already stated, there are at least thirty-seven elements in the diet necessary for normal metabolism. If any one of these elements is lacking in the diet, the health suffers. The specific influence of vitamin A on resistance to infection is widely recognized. It is also rather generally held that the rachitic infant is more susceptible to infection than the nonrachitic infant. It should be noted that the rachitic infant frequently does not enjoy the best surroundings, and this poor environment may also be a factor in lowering its resistance to infection. In experimental work on animals, however, it has been shown that the addition of vitamin D to the diet of rachitic animals greatly increases their resistance to an infection produced by a typhoid-like organism, isolated from the middle ear of a rat, and known as Salmonella muriotitis. It should not be interpreted, however, that a lack of vitamin D has any more effect in lowering the resistance of a person than has a lack of any one of the other essential elements.

Since the natural food sources of vitamin D are largely limited to cod liver oil, canned fish, eggs and summer milk, it is evident that the human race has depended largely on sunshine to produce vitamin D in the body. This is accomplished by the action of the sun's rays on the ergosterol naturally present in the skin. Under modern conditions of living, however, a large proportion of the population congregates in cities in buildings, factories and schools. In urban centers the sunshine is markedly reduced by shadows from buildings and by the smoke and dust in the atmosphere. In the temperate zone, inclement weather for many months each year interferes with the exposure of the body to the sun's rays. In addition, during the winter months the vitamin D value of the sun's rays is markedly reduced, owing to the low altitude of the sun above the horizon.

In view of the continued prevalence of rickets and other evidences of a lack of this vitamin, it is apparent that fish oils (cod liver oil) and viosterol, as administered at the present time, have not fully met the

situation. According to the generally used biologic methods of assay, ordinary foods, with the possible exception of eggs and summer milk, do not contain appreciable amounts of this vitamin. A few foods, however, are now being fortified by the addition of vitamin D. The addition of this vitamin in adequate amounts to a food previously lacking in vitamin D renders that food more wholesome and more valuable from a nutritional standpoint than it was before. This new source of vitamin D in foods such as bread, and possibly milk, gives promise of providing this essential element to the population at large in an acceptable and adequate form. There is no evidence that many times the therapeutic amount of vitamin D can produce any harmful effects.

Every effort should be made to insure that advertisers adhere strictly to the truth in whatever claims they publish.

Special commendation is given to the American Medical Association for its successful selection for acceptance of only such foods as are scientifically sound and for its insistence that the advertising of such accepted foods be kept strictly within proper limits.

While the public should be protected against unscientific appeals and exaggerated claims, worthwhile nutritional improvements in foods should be encouraged from the standpoint of the public good.

Pediatric Biographies

OSWALD GABELKHOVER
1587-1616

JOHN RUHRÄH, M.D.
BALTIMORE

Gabelkhover was born at Tübingen, a member of a family of some prominence. Over a period of thirty-seven years he resided at Stuttgart and was physician to four successive dukes of Würtemburg. It was at the order of one of these princes that he undertook, with the aid of his son, to write a history of Würtemburg. He had completed only one part when he died, and the rest was never finished. The part completed was never printed, and was placed in the library in Stuttgart.

Gabelkhover's work on medicine met with a different fate. According to Haller, Duke Louis furnished the material, and this led the writer of Gabelkhover's biographical notice in the "Dictionaire des sciences médicales" to state that if this is so it accounts for the mediocrity of the book. But the text was well received, and it went through a surprising number of editions at Tübingen, Frankfort and Strassburg. The years of these are mute witnesses to its popularity: 1589, 1594, 1594, 1594, 1596, 1599, 1603, 1606, 1618, 1618, 1665 and 1680. It was translated into Dutch in 1598; into English by Batt of London in 1599, and commented on by Claude Diodati of Frieburg in 1598.

This work is entitled "Artzney-Buch, darinnen fast für alle dess menschlichen Leibes Anliegen und Gebrechen, ausserlesene und bewährte Artzneyen, gemeinen Vatterland Teutsher Nation zu gutem aus vielen hohen und nidern stands-Personen geheim geschriebenen Artzney Büchern zusammen getragen und in Truck verfeitigt." This may be freely rendered as "Oswald Gabelkhover's medicine book in which to help nearly all that concerns and ailments of the human body are selected and proven medicines common to the Fatherland, the German nation, brought together and printed from many secret medicine books written by persons of high and low position."

The book is interesting as an example of the books used in the sixteenth and seventeenth centuries for disseminating medical knowl-

edge to the people as well as to the medical profession. The 1794 Frankfort edition has 797 pages, is well indexed and divided into five parts of which only the part, "For all kinds of disease of young children" need be considered. When his material is from high sources, such as from the Gräfin von Castel or the Gräfin von Erbach, he takes care to give his source; otherwise he omits it.

Vir pietate grauis, candore fidei, probatus.
Historicus: Medicus: Bibliotheca loquens.
O, si quam facies, tam mens tibi visa, dolores
Hunc morte abruptum succubuisse virum.

Oswald Gabelkhover

The book is largely therapeutic. After naming the disease or giving a short description, Gabelkhover proceeded to outline what should be done. It is a book of the period. The author ventured little on his own account but published what others used. It is no better and no worse than most of the books on the diseases of children in use at that time.

Any book that goes through fifteen editions, part of them in foreign tongues, has an appeal of some sort, and this one appealed to the public, eager, then as now, to find some relief from the many ills which beset it.

One short excerpt will show what appealed to the seventeenth century mind:

WHEN A CHILD HAS DIFFICULTY TEETHING

Give him once daily two spoonfuls of wine which is not strong and rub his gums with it.

Or: Rub them with hare's fat or with hare's brains.

Arzneybuch.

Darinnen/

Auß gnädigem Beuelch / weilund des Durchleuchtigen Hochgebornen Fürsten vnnd Herrn/ Herrn Ludwigen/ Hertzogen zu Würtemberg vnnd Theck/ Grauen zu Mümpelgart/ &c. meines gnädigen Fürsten vnnd Herrn/ hochlöblicher/ Christmilter gedächtnus/

Vast für alle/ des Menschlichen Leibs/ Anligen vnnd Gebrechen/ außerlesene vnd bewehrte Artzneyen/ gemeinem Vatterland Teutscher Nation zu gutem/ auß vilen Hohen vnd Nidern Stands Personen geschribnen Artzneybüchern zusamen getragen/ vnd in den Truck verfertiget sind/

Durch Hochermeldter Ihrer F. G. Hofmedicum Oßwaldt Gäbelkhouern / der Artzney Doctorn:

Vnd nun mit gnädiger Bewilligung des auch Durchleuchtigen Hochgebornen Fürsten vnnd Herrn/ Herrn Friderichen/ Hertzogen zu Würtemberg vnd Theck/ Grauen zu Mümpelgart/ &c. meines auch gnädigen Fürsten vnd Herrn/ publiciert/ an vilen orten verbessert/ vnd mit nutzlichen heilsamen Artzneyen gemehret worden.

Was von der Baßlerischen/ Franckfurtischen/ vnd Eißlebischen Edition diß Artzneybuchs/ zuhalten/ wirdt der gutherzig Leser wol auß nachfolgender Vorred vernemen.

Mit Röm. Keyſ. May. Gnad vnnd Freyheit/ innenhalt zweintzig Jaren nicht nachzudrucken.

Getruckt zu Tübingen/ bey Georgen Gruppenbach/ im Jar 1596.

Title page of Gabelkhover's book.

Item: Hang a hare's tooth about his neck and a large wolf's tooth so he can put it in his mouth and bite it.

That the child do not teeth hard hang the root of a Scheelkrout (celodine) about the neck and rub his little gums with rose honey.

Or: When one cooks the fresh pap for the child let the mother milk a little from her breasts into it and let it cook and give it to the child to eat so that it will cut its teeth without pain. This has been proved.

WHEN CHILDREN HAVE A RHEUM ON THE CHEST AND COUGH

Take the fat off a pike, put it in a little glass that is narrow above, turn it over another wide glass and place it in the sun, so that the grease melts and drops into the lower glass. Use the contents and smear the soles of the feet well with it. This is proved.

WHEN CHILDREN ARE TOO FLUID TO STOP THE FLOW IN THE HEAD

Take red roses and mastich equal parts, clean and mix. When the child is laid down strew as much of these as you can pick up between two fingers, on the head.

Pediatrics in Art

THE CIRCUMCISION

JOHN RUHRÄH, M.D.
BALTIMORE

The circumcision of the Christ Child, which according to St. Luke took place on the eighth day, has been pictured many times. Simeon, of *Nunc Dimittis* fame, is figured holding the child. The details vary. In

The Circumcision.

this reproduction of a painting by some unknown follower of M. Tucher, the artist has figured the Child held over a large pan, as if considerable hemorrhage was expected, while the *mohel* wields a very large knife such as is seen in most of the representations of the circumcision. While the circumcision took place on the eighth day and there have been hundreds of pictures of the infant Jesus, not one, so far as I have been able to discover, shows a circumcised child, with, of course, the exception of the ones showing the operation itself.

Abstracts from Current Literature

Anatomy and Physiology

THE HYALINE MEMBRANE IN THE LUNGS: I. A DESCRIPTIVE STUDY. SIDNEY FARBER and JAMES L. WILSON, Arch. Path. **14**:437 (Oct.) 1932.

A peculiar eosin-staining membrane, the so-called hyaline membrane lining the walls of bronchioles and alveoli, was noted in the lungs of patients who died of influenza in the epidemic of 1918. At that time this formation was so frequently seen that it was considered pathognomonic of the disease. The authors observed the hyaline membrane in over fifty new-born infants with a history at birth suggesting aspiration of the contents of the amniotic sac, and in twenty infants and young children dying of hemolytic streptococcic pneumonia. Fat was frequently found in the membrane, but fibrin could not be demonstrated by special stains. It is suggested that the membrane is simply the result of the mechanical dispersion of foreign material toward the periphery of the air sacs by air violently inspired during dyspnea. The material consists of autolyzed exudate and necrotic débris in cases of influenzal and streptococcic pneumonia and of vernix caseosa and cornified epithelial cells in instances following aspiration of the contents of the amniotic sac.

LEMASTER, Evanston, Ill.

THE HYALINE MEMBRANE IN THE LUNGS: II. AN EXPERIMENTAL STUDY. SIDNEY FARBER and JAMES L. WILSON, Arch. Path. **14**:450 (Oct.) 1932.

It was found impossible under any circumstances to draw fat into the alveolar spaces from the blood stream by prolonged overventilation in animals. Animals dying from marked dyspnea showed serum pressed into membrane formation against the alveolar walls. When there was only slight dyspnea before death from anoxemia, serum was found in the alveoli, but no formation of membranes. Vigorous artificial respiration done after the instillation of foreign substances into the trachea of animals produced characteristic membranes. The eosin-staining character of the typical membrane, as seen in influenzal and streptococcic pneumonia, was found to depend on the degree of autolysis of the exudate.

LEMASTER, Evanston, Ill.

COMPENDIA OF INFANTILE PHYSIOLOGY: I. THE BLOOD. C. NIZZOLI, Prat. pediat. **10**:397 (Sept.) 1932.

This article is a brief but inclusive summary of constants relating to the morphologic, chemical and immunologic aspects of the blood in the neonatal and infantile periods of life, compiled from sources which are difficult to verify as only the names of the authors are listed.

DOOLEY, Kent, Conn.

Pathology, Bacteriology and Biochemistry

PARATHYROID HORMONE: ITS REGULATORY ACTION ON THE PARATHYROID GLANDS AND TOXIC EFFECT ON THE TISSUES OF THE RAT. F. A. MCJUNKIN, W. R. TWEEDY and H. C. BRENHAUS, Arch. Path. **14**:649 (Nov.) 1932.

Injections of parathyroid hormone were found definitely to decrease the number of mitotic figures in the parathyroid gland of the rat in amounts insufficient to cause destructive lesions or hypercalcemia. Parathyroid hormone produced primary toxic lesions in the heart and kidneys, before calcification or circulatory failure occurred. Similar areas of necrosis were produced by injection of the hormone directly into the substance of parenchymatous glands and also by the intraperitoneal

injection of calcium gluconate alone. The authors believe that the hormone and calcium gluconate, as well as viosterol, injure the parenchymal cells by disturbing the calcium components of the tissue fluids of the cells.

LeMaster, Evanston, Ill.

Comparative Pollen Mold, Butterfly and Moth Emanation Content of the Air. Ray M. Balyeat and T. R. Steinen, J. Allergy **3**:227 (March) 1932.

The butterfly and moth scale and mold content of the air is highest in June and early July in Oklahoma, although the mold count continues to be moderately high throughout the summer. Two of 79 asthmatic patients were sensitive to an extract of butterfly and moth, and 4 of 480 patients were sensitive to mold.

Hoyer, Cincinnati.

The Allergically Active Substance in Pollen: A Chemical and Biologic Study of Phleum Pratense (Timothy) Pollen. Arthur Stull, Robert A. Cooke and Robert Chobot, J. Allergy **3**:341 (May) 1932.

Laboratory procedures are given by which an albuminous protein is extracted from timothy pollen which is allergically active. It is similar to the active material in ragweed pollen. Old water extracts of timothy pollen are not so allergically active as new extracts. Alcoholic treatment of the pollen and heating the extract lessen the activity.

No albumin could be obtained from cattail pollen. This may explain the absence of cutaneous reactivity and clinical symptoms from this pollen.

Hoyer, Cincinnati.

The Efficacy of Hot-House Grown Pollen as Compared with Field Grown Pollen. Harry B. Wilmer and Herbert M. Cobe, J. Allergy **3**:442 (July) 1932.

Low ragweed (Abrosia elatior) was grown in a greenhouse under as ideal conditions as it was possible to obtain. The potency of the pollen obtained from this crop of ragweed in eliciting a reaction of the skin was compared with that of pollen obtained from a crop grown in a field near the greenhouse, with that of pollen obtained from three commercial houses and with that of a field pollen kept from 1923. Two of the pollens from the commercial houses were from the 1931 crop, the same year as the greenhouse pollen, and one was from the 1926 crop. All extracts of these pollens were prepared in the same way. The greenhouse grown pollen has a greater potency in producing a skin reaction than has field grown pollen and shows less contamination from bacteria and fungus growth, thus minimizing the foreign protein content of the extract.

Hoyer, Cincinnati.

Serological Diversity Among Meningococci. Sara E. Branham, J. Immunol. **23**:49 (July) 1932.

The author made an intensive serologic study of 375 strains of meningococci. The extreme difficulty in accurately grouping all strains of meningococci is pointed out. This difficulty is occasioned by the following factors: (*a*) lack of specificity among meningococci; (*b*) lack of specificity in "typing" serum; (*c*) lack of antigenic stability in meningococci, and (*d*) failure to do the "typing" soon after isolation. The marked "overlapping" of strains is apparent in this study.

The author found the relative proportion of strains falling into the four groups of Gordon and Murray to be quite different in the outbreaks of 1927 to 1930 than in the outbreaks of 1915 to 1918. More than 80 per cent of the strains studied were placed in groups I and III.

Fothergill, Boston.

EXPERIMENTAL PRODUCTION OF KIDNEY LESIONS BY DIET. W. CRAMER, Lancet **2**:174 (July 23) 1932.

In experiments on rats kept on synthetic diets in which the proportion of inorganic salts in the salt mixture was varied so as to produce mineral imbalance, it was found that the omission of magnesium salts from the salt mixture produced extensive degenerative lesions in the glomeruli and tubules of the kidney. The degenerative changes were most marked at the junction of the cortex and medulla.

The animals remained normal in their outward appearance, growth and nutritive conditions, and the kidney appeared to be selectively affected in contrast with the more general pathologic lesions observed by MacCallum and his collaborators in animals on a diet completely deprived of magnesium.

LANGMANN, New York.

BIOLOGICAL TYPES OF DIPHTHERIA BACILLUS. HELEN A. WRIGHT and ADAM L. K. RANKIN, Lancet **2**:884 (Oct. 22) 1932.

The authors made a study of fifty cases of clinical diphtheria, from which organisms having the accepted biologic characters of B. diphtheriae were isolated. Forty-eight of them were all proved virulent by animal inoculation tests. On further study the organisms were found to have different characteristics, but no hard-and-fast bacteriologic classification or clinical correlation was arrived at. In other words, the authors were unable to differentiate the two types: B. diphtheriae "mitis" and B. diphtheriae "gravis" associated respectively with mild and severe cases giving a poor response to treatment with antitoxin as described by Anderson, Happold, McLeod and Thomson.

LANGMANN, New York.

INFECTION AND BACTERIOLOGY. R. FLACKS, Arch. f. Kinderh. **95**:210 (Feb. 5) 1932.

The author reviews briefly the relation of bacteriology to disease, the advances that have been made in diagnosis through cultural and immunologic methods and the immense contributions to preventive medicine. However, many questions of epidemiology still remain unsolved. In conclusion, he emphasizes the fact that bacteriologic knowledge alone is not sufficient in the treatment of disease, but that primary attention must be paid to the patient and to building up his resistance and strength in every possible way.

LESLIE, Evanston, Ill.

VISCOSITY STUDIES IN INFANCY: II. PLASMA AND SERUM VISCOSITY CURVES IN NORMAL AND ATROPHIC INFANTS. JULIUS SURÁNYI and PETER SONNAUER, Arch. f. Kinderh. **97**:152 (Sept. 9) 1932.

Determinations of viscosity were made on the plasma and serum of normal and atrophic infants. The authors found that in infants with nutritional disturbances, especially in those with the clinical signs of decomposition, the fluid-elasticity of the plasma, as affected by pressure, was reduced in comparison to the fluid-elasticity of the plasma of normal infants. There was less difference between the viscosity of the plasma and that of the serum in atrophic infants than in normal infants.

LEMASTER, Evanston, Ill.

METHOD FOR THE IODOMETRIC MICRODETERMINATION OF MAGNESIUM IN ORGANIC FLUIDS. CHRISTIAN BOMSKOV, Ztschr. f. physiol. Chem. **202**:32, 1931.

The author describes a method for the quantitative estimation of magnesium. The analysis is accurate, requires less time than other methods and was especially devised for use with blood serum. The magnesium of albumin-free serum is precipitated with 8 oxychinolin. The precipitate is dissolved in hydrochloric acid and bromidized. The surplus bromide is titrated against an iodide solution.

LEMASTER, Evanston, Ill.

Nutrition

IRRADIATED MILK: THE NEW RICKETS PREVENTION THERAPY. ESTHER B. HARDISTY, Arch. Pediat. **49**:236 (April) 1932.

Since the disagreeable taste and odor of cod liver oil preclude its universal adoption, the writer feels that irradiated milk should eventually become the antirachitic agent of choice. She feels that irradiated milk of standard quality and uniformity is now being commercially produced, that such irradiated milk retains its antirachitic potency over a long period of time and that correctly irradiated milk undergoes none of the adverse effects, such as change of taste or odor, which are found in milk irradiated over longer periods of time. Some of the literature pertaining to irradiated foods is discussed. It appears to be the writer's opinion that the incidence of rickets would be appreciably decreased if all babies were fed irradiated milk.

WADDELL, JR., University, Va.

SCURVY IN A BREAST FED INFANT BEFORE THREE WEEKS. ALBERT L. HILL, Arch. Pediat. **49**:251 (April) 1932.

A case of scurvy occurring in a breast-fed Chinese infant 5 weeks old is reported. The author calls attention to the rarity of this disease before the age of 5 months, even in artificially fed babies. The diet of the mother is interesting in that it contained plenty of apples, strawberries, peaches, pears and especially bananas and in that she consistently avoided oranges and tomatoes. Treatment consisted of 2 ounces (56.7 Gm.) of orange juice added to the baby's diet, the mother's diet being supplemented with 8 ounces (226.8 Gm.) of orange juice. Following this treatment improvement was rapid.

WADDELL, JR., University, Va.

VALUE OF PROPERLY MODIFIED POWDERED MILK IN INFANT FEEDING. H. R. LITCHFIELD, Arch. Pediat. **49**:327 (May) 1932.

The writer reports favorable results in the use of powdered milk as a complementary feeding for new-born infants and for routine use in infant feeding. Weight curves of breast-fed infants compared with those of artificially fed infants in the outpatient department showed little appreciable differences in weight; in fact, the evidence was a little more in favor of the artificially fed babies.

WADDELL, University, Va.

A SIMPLE INEXPENSIVE STOCK FORMULA FOR YOUNG INFANTS. LOUIS SAUER, J. Pediat. **1**:194 (Aug.) 1932.

A stock formula (evaporated milk, 6 ounces [180 cc.], water, 12 ounces [360 cc.], and lactose, 1 ounce [30 Gm.]) was fed to 150 infants in the amount of from 40 to 50 calories per pound of body weight daily. These infants compared favorably to nursing infants in gain in weight, freedom from disturbances and the character of the stools. The formula is inexpensive and easy to prepare and does not need to be changed. Larger amounts are fed as the infant becomes older and heavier.

LEMASTER, Evanston, Ill.

A NOTE ON THE ABSORPTION, SERUM CONCENTRATION AND NARCOTIC EFFECTS OF MAGNESIUM. ISAAC NEUWIRTH and GEORGE B. WALLACE, J. Pharmacol. & Exper. Therap. **45**:109 (May) 1932.

The author presents further evidence in human beings that the depressive effect of magnesium sulphate begins with a blood magnesium concentration of from 5 to 6 mg. per hundred cubic centimeters as a result of 0.25 Gm. of the sulphate given subcutaneously. The full "surgical" effect results from 20 mg. per hundred cubic centimeters, and the lethal concentration is somewhat above this. In dogs the lethal concentration is readily reached by magnesium chloride by mouth.

PILCHER, Cleveland.

THE PATHOLOGIC CHANGES DURING THE EARLY STAGES OF VITAMIN A DEFICIENCY IN THE ALBINO RAT. HARVEY S. THATCHER and BARNETT SURE, South. M. J. **25**:581 (June) 1932.

The object of the investigation was to find out at what stage of vitamin A deficiency disease metaplasia and infection began. It was found that even in the early stages of vitamin depletion there developed metaplastic changes, with definite regions of infection in the posterior portion of the tongue, in the ducts of the salivary glands and in the respiratory tract. Atrophy of the spleen was a common finding.

The authors conclude from their observations that as a result of vitamin A deficiency changes in the epithelial structures in the respiratory tract of man may possibly begin before definite external symptoms are apparent, which later are responsible for respiratory disturbances such as are found associated with the common cold, acute bronchitis and bronchopneumonia. SCHLUTZ, Chicago.

IMPROPER USE OF MILK. FELIX S. MARTIN, Texas State J. Med. **27**:645 (Jan.) 1932.

The author warns against a too strict adherence to the slogan of commercial propaganda "a quart of milk per person per day." Too much milk with shortage of other foods causes nutritional disturbances. The milk from Jersey cows and other milks rich in fat may cause recurrent acidosis, vomiting and chronic constipation. Statistics from the Elizabeth McCormick Memorial Fund comparing, among the children in the public schools of Joliet, Ill., the mental and physical development of those artificially fed and those breast-fed are given. A plea is made for breast feeding. LUECKE, Dallas, Texas.

LACTIC ACID IN CARDIAC METABOLISM. EMILIO MARTINI, Boll. d. Soc. ital. di biol. sper. **6**:395, 1931.

Lactic acid is found in the heart functioning under aerobic condition; the amount formed is greater under anaerobic conditions. Only traces of lactic acid are found in the heart poisoned by mono-iodo acetic acid, whether under aerobic or anaerobic conditions. The poisoned heart under anaerobiosis enters readily into an irreversible systolic arrest; on renewal of the fluid, the heart loses its contractility, but does not go into a state of rigidity; when air is introduced the heart functions again. KUGELMASS, New York.

STUDIES IN THE ACID BASE METABOLISM OF THE CHILD. H. FORSCHNER-BOKE, A. HOTTINGER and G. HOTTINGER, Monatschr. f. Kinderh. **53**:153, 1932.

In this article, the third of the series, the writers studied the effects of oral administration of acids and alkalis on the excretion of organic acids.

Sodium bicarbonate caused a definite increase, although not in the acids soluble in ether. The excretion of amino-acids was decidedly increased, while that of uric acid and creatine was only slightly augmented. There is no relation between the excretion of amino-acids and of ammonia. Phosphoric acid seems more concerned with maintaining an acid-base relationship.

Giving large quantities of mineral acids caused little change in the intermediary metabolism. The neutralization of these acids occurs mainly in the intestine.

The feeding of oxy-iso-butyric acid results in a marked increase in the organic acid excretion, which embraces not only the amino-acids but also those of the ether-soluble class.

Continued administration of lactic acid is apparently so compensated for by the intermediary metabolism that no increased excretion results. A short intensive feeding of lactic acid results in a definite increase in the organic acid excretion, but this is in amino-acid and not in lactic acid, showing that the lactic acid has been metamorphosed by the intermediary metabolism. GERSTLEY, Chicago.

SUMMER DIARRHEA AND ITS PROPHYLAXIS. A. O. GERSHENSON, Oxmat. i Ozdp. **1**:37, 1931.

There is high mortality from summer diarrhea among children of early ages in Ukrainia.

Before the revolution no consideration was given to this subject; however, since the revolution, because of better progress in sanitation, the mortality has been greatly reduced. In spite of improved sanitation and care for infants, 80 per cent of them are afflicted with summer diarrhea in Odessa.

The mortality in the villages is still very high, because of the ignorance and superstition of the people.

Three main points are emphasized in the prophylaxis of summer diarrhea: (1) the building of sanitary summer camps for children; (2) the furnishing of clean milk, and (3) the promotion of elimination, which diminishes the acidity of the body.

KRUPINSKI, Chicago.

Prenatal Conditions

OBSERVATIONS ON EMBRYONIC AND FETAL MOVEMENTS OF THE CAT. W. F. WINDLE and A. M. GRIFFIN, J. Comp. Neurol. **52**:149 (Feb.) 1931.

Pregnant cats were placed under a light ether anesthesia; the carotid arteries were ligated; a cannula was inserted into the trachea, and the animal was decerebrated. The animal was then allowed from one to four hours to recover from the effects of the ether, after which the fetuses were delivered from the uterus and were observed within the amnion, with the circulation intact. Methods of studying the fetuses varied according to their size. Movements of the smallest embryos were visible only at the moment of delivery. Large embryos could be transferred to warm physiologic solution of sodium chloride and studied there. Movements persisted longest when the fetus and placenta were transferred to the solution. By this method the development of motility has been followed from its earliest manifestation as a slight ventrolateral flexion in the 16 mm. cat embryo to a time shortly before birth. The movements are to a large degree massive and generalized with a gradual evolution of the more discrete reflexes from the total pattern. In other cases the reflexes appear with no apparent relation to the primitive behavioral background. Functional motor differentiation proceeds cephalocaudally and proximodistally. Postural and locomotor reactions seem to appear in the fourth fetal quarter, feeding response appearing later. No conclusions are drawn as to the mechanisms in the behavior movements.

ADDISON, Philadelphia. [ARCH. NEUROL. & PSYCHIAT.]

INITIAL INSPIRATION IN THE MAMMALIAN FETUS. E. L. COREY, J. Exper. Zool. **61**:1 (Jan. 5) 1932.

The fetus of the albino rat is first capable of spontaneous respiratory movements at approximately 18 mm. of crown-rump length. Ligation of the umbilical cord initiated respiratory movements under all conditions imposed on the fetus in the experiments. Under the influence of asphyxia, respiratory movements took place *in utero,* within the amniotic sac, in an isotonic solution of sodium chloride at body temperature, in air, and under a pressure of 200 mm. of mercury. Cooling is of little importance as a factor in the initiation of the first inspiration, since asphyxiated fetuses respired with equal facility at either room or body temperature. Drying of the skin may be responsible for initiating respiration without asphyxia. The initial inspiration of the mammalian fetus is brought about by the asphyxia coincident with the separation of the placenta from the uterus at birth. Drying of the skin on contact with the air may act as an accessory factor in the process, but it must be considered as a relatively weak one in the initiation of the first inspiration.

WYMAN, Boston. [ARCH. NEUROL. & PSYCHIAT.]

CONGENITAL DEFORMITY OF THE LARGE ARTERIES. WILFRID SHELDON, Proc. Roy. Soc. Med. **25**:792 (April) 1932.

A boy of 9 years showed unusually marked pulsation of the arteries of the right side of the neck along the right clavicle. In the episternal notch an enlarged innominate artery could be felt undergoing strong pulsation; the right common carotid and right subclavian arteries were also enlarged and showed marked pulsation. Pulsation was also felt over the abdominal aorta and the femoral arteries. There was no abnormal collateral circulation. The pulse on the right side was stronger than that on the left. The heart, clinically, was not enlarged, and its action was normal

WILLIAMSON, New Orleans.

CLINICAL CONTRIBUTION TO THE STUDY OF OXYCEPHALY. T. BARDANZELLU, Arch. di ottal. **39**:201 (May) 1932.

The various theories of the causation of oxycephaly are reviewed in detail, and a case is reported. A boy of 4 years showed prominent eyes and a marked frontal prominence at birth. The exophthalmos and changes in the skull progressed, and, at the age of 1 year, periods of stupor and headache occurred frequently. After this, general development was fairly normal. When seen by the author the skull was narrow, with marked frontal prominence. Vision was: right eye, 1/4; left eye, 1/6. Exophthalmos measured 24 on the right and 26 on the left (Hertel). At spinal puncture the fluid escaped under high pressure. Both disks showed simple atrophy. Roentgenograms showed bony thickening in the region of the anterior fontanel, a concavity in the left frontal region and marked digital impressions. The optic foramina were normal in size. The suture lines could not be seen.

The author accepts as the cause of oxycephaly a premature closure of the sutures, allowing the brain to expand in the direction in which they remain longest open. In this case the frontoparietal sutures closed in their lateral portions, remaining open above, where the compensatory prominence occurred. The left side had evidently closed earliest, accounting for the left-sided concavity. Variations in the location of premature closure account for the various types of skull seen in this and allied conditions.

As the cause of early closure, the author considers most probable a low grade pachymeningitis, indicated here by the history of spasms and the increased pressure of the cerebrospinal fluid. Rickets, although present in his patient, cannot be given causal significance, he believes, since the deformity was present at birth. He is more inclined to agree with Bertolotti that adenoiditis, also present here, could account for the meningitis. A bibliography and photographs are included.

GIFFORD, Chicago. [ARCH. OPHTH.]

TRANSPOSITION OF THE GREAT VESSELS. G. FANCONI, Arch. f. Kinderh. **95**:314 (Feb. 5) 1932.

Clinically, transposition of the great vessels may be diagnosed by high grade cyanosis, slapping heart tones and a bilateral increase in cardiac dulness. A systolic murmur may or may not be present. The roentgen picture aids in the facility of diagnosis. The heart is seen to be ballooned out on both sides, and the shadow cast by the great vessels is much narrower than normal. The reason for this is that the aorta comes from the right ventricle and lies directly in front of the pulmonary artery, and there is not the normal crossing of the two great vessels.

LESLIE, Evanston, Ill.

RESPIRATORY DISTURBANCES OF THE PREMATURE INFANT. ALBRECHT PEIPER, Ergebn. d. inn. Med. u. Kinderh. **40**:1, 1931.

(This is a highly theoretical and biologico-comparative study. The assumption of several components of the respiratory center is entirely speculative.)

Knowledge about the respiratory center originated hitherto almost entirely from experiments on animals, because an investigation in human beings offered

great difficulties. Premature babies offer a welcome opportunity to observe more closely the development and activity of the human respiratory center and to compare it with the findings in lower animals. The results follow:

The human respiratory center forms a physiologic and not an anatomic unit. It consists of several components which are physiologically and phylogenetically distinguishable, and which have so developed that the older components are subject to the younger and are limited by the latter in their activity. In the premature infant, the unripe respiratory center divides itself readily into its components, so that the younger parts temporarily cease to function, thereby releasing the older parts. Thus there arises a difficulty in breathing that is dependent only on the older components. In such a case it is also possible for a block in the respiratory center to develop, so that, after the interferences are removed, two subcenters simultaneously and more or less independently of one another exercise an influence on respiration.

The most important components of the respiratory center are—aside from the youngest center, which regulates the highest form of respiration—the periodic center, which is closely associated with a center for periodic movements, the gasping center, the hiccup center and the center for laryngeal movements. Comparative physiology offers many a basis for the assumption that most of these centers phylogenetically have developed one after another. Also in the lower animal there reappear under certain conditions lower forms of respiration in the shape of labored breathing in order to preserve life after the cessation of function of the higher centers.

The independent action of individual components of the respiratory center is not at all rare and occurs every now and then in every human being. The most frequent occasions are birth and death, sleep and attacks of singultus. Besides that, certain definite diseases favor the subdivision of the respiratory center into its components, as, for instance, heart disease in adults, meningitis in children and, in the case of premature infants, whose immature respiratory center is most sensitive, practically all the serious pathologic conditions of childhood.

The early death of the premature infant is caused largely by the sensitiveness of the immature respiratory center.

AUTHOR'S SUMMARY.

TOWER SKULL (OXYCEPHALY) AS A CONSTITUTIONAL ANOMALY AND A CLINICAL SYMPTOM. HANS GUNTHER, Ergebn. d. inn. Med. u. Kinderh. **40**:40, 1931.

The author cites the following measurements as indicative of oxycephaly: 1. The circumference of the head is always diminished (under 53.5 cm.). 2. The ear-height index is always increased (above 77 cm.). 3. The Calotte-height index is always above 58 cm. 4. The index-product is almost always abnormally increased (over 0.67). 5. The height-circumference index is mostly increased (over 120 cm). 6. The head index is mostly above 86 cm. (hyperbrachycephaly). But there are skulls that yield these positive indexes and yet lack the typical physiognomy of tower skull. For this reason the author maintains that the special physiognomy of oxycephaly—the abnormal height of the skull, the high forehead and the flat occiput—is sufficient to make an intuitive diagnosis. The author estimates the frequency of oxycephaly as less than 0.1 per cent of the European population, and would therefore consider it as a rare anomaly. One must, however, consider also the possibility of racial differences in frequency of occurrence. There is no definite evidence of predisposition of one sex or the other.

The author differentiates two main forms, the cylindric tower head (turricephaly) and the conical tower head (oxycephaly).

The cause of genuine oxycephaly is a hypoplasia of the base of the skull, which is partly compensated by an abnormally high growth of the roof of the skull and partly by a depression of the middle cranial fossa. There are disturbance in the bony growth and vascularization of the primordial skull. The question of obliteration of sutures is only of secondary importance.

This developmental anomaly is not genotypical (i. e., caused by abnormal hereditary factors) but is probably due to a secondary injury of the germ plasm in early embryonal life. The injurious influences are probably mechanical or toxic, and not such pathogenic factors as syphilis, rickets or endocrine disturbances. Oxycephaly is mostly a congenital and not a hereditary constitutional anomaly.

The clinical symptoms of oxycephaly are due to the special morphology of the deformed skull, which the author terms craniodysplasia. The base of the skull is hypoplastic and deformed. The loss in space is compensated for not only by an increased development of the height of the skull but also by a depression of the base, which is recognized externally by the low position of the auditory canals. The depression of the base of the skull, or "basilary lordosis," is recognized roentgenologically by the abnormal depth of the cerebral fossae (especially the middle one) and the sella. Aside from the low position of the sella turcica, it may also be enlarged, widened or diminished in size; at times the compression brings the anterior and posterior clinoid processes so close together that they almost touch. The basilar lordosis can be metrically determined on the roentgenogram. A line drawn from the nasion to the ephippium and one from the ephippium to the basion form an angle (angulus sphenoidalis) which measures normally from 130 to 135 degrees, whereas in oxycephaly the angle is greater (up to 180 degrees), even larger than in rachitic hydrocephalus. The tables are thinned in the upper and posterior parts. Occasionally one sees hyperostosis, especially in the anterior portion of the skull, due, according to some authors, to a secondary hyperemia of the cranial bones. The strong development of the digital impressions is especially emphasized by most roentgenologists. The venous stasis, caused by an interference with the venous return through the basal foramina, causes many symptoms: (1) evidence of stasis of the retinal veins, (2) dilatation of the venous sinuses—especially of the lateral and petrosal sinuses—and (3) dilatation of the subcutaneous veins of the scalp, especially noticeable in the frontal and temporal regions. The skeleton of the face is influenced in its growth secondarily by the depression of the middle fossa and by the deformation of the sphenoid bone. The face appears relatively narrow and long. The angulus facialis is from 8 to 10 per cent greater, amounting to from 60 to 62 degrees. Occasionally there is asymmetry of the whole head. The orbit is shortened in the sagittal direction. The orbital fossae appear abnormally high. The nose is strikingly small, long or narrow. Frequently there is a curvature of the nasal septum. The upper jaw is often deformed and hypoplastic. The high arched palate is a common symptom. Anomalies of the denture are frequent and are the result of the deformation of the upper jaw; they may find expression in anomalies of posture, because the teeth cannot find enough room in the hypoplastic dental arch, in form, in delayed dentition, in caries and in other dental defects and sometimes even in alveolar prognathism.

Oxycephaly causes a disturbance in the intracranial circulation, as a result of which a definite group of clinical symptoms comes to the surface. Increased intracranial pressure is recognized not only by the venous congestion—especially of the retinal veins—but also by lumbar puncture. Headache and migraine are not infrequent complaints in oxycephaly; convulsions have been observed. The mentality is in most cases not affected. The author found a mild degree of feeblemindedness in 20 per cent of his cases. On account of the deformity of the orbits and disturbance of circulation, exophthalmos becomes a frequent finding, and marked hypermetropia is often encountered. Gunther found stunted growth in one half and abnormally small stature in at least 30 per cent of his cases.

The author finally subdivides oxycephaly into four groups, depending on the association of changes of certain organs with the deformity of the skull. The divisions are: (1) dyscraniodysopia, in which the symptoms of the eye are especially emphasized; (2) acrocraniodyshemia, in which an association of the erythropoietic system with the deformity in the skull is brought out; (3) dys-

craniodysphalangia, in which anomalies of the extremities are associated, and (4) dysplasia-osteo-neuro-endocrina, in which, as the name indicates, various disturbances of the bones, nerves and endocrine system are described, in association with oxycephaly; among the endocrine disturbances, dystrophia adiposogenitalis is particularly emphasized.

CAPPER, Philadelphia.

Diseases of the New-Born

BACTERIOLOGY OF THE NEW-BORN WITH SPECIAL REFERENCE TO HEMOLYTIC STREPTOCOCCI. LEON J. ARIES, I. PILOT and MYRTLE S. SHAFFER, Am. J. Obst. & Gynec. **23**:745 (May) 1932.

Three hundred and eighty-seven throat cultures from one hundred and thirty new-born infants were taken. Ten of thirty-two cultures taken during the first twenty-four hours and twenty of fifty-six cultures taken during the second twenty-four hours of life contained colonies of green streptococci, B. coli and staphylococci. Seventy-eight cultures taken within the first seventy-two hours of life contained organisms. The throats of two infants remained sterile, but showed organisms on the following day. Four cases of the beta type of hemolytic streptococci were found in this series, but the streptococci were not present constantly. Twenty-nine infants showed the alpha type of hemolytic streptococci in repeated cultures. Green streptococci were the most common invaders and were present most constantly. Beta hemolytic streptococci were found rarely on the surface of infants' tonsils as compared with their frequent appearance in children and adults.

ZIEGLER, Minneapolis.

CARE OF THE NEW-BORN. SAMUEL GOLDBERG, M. J. & Rec. **135**:562 (June 15) 1932.

The author points out how important it is for the infant to be given the mother's milk and how important it is for the mother to take great care of herself during the period of lactation. She should take proper rest, exercise and diet and should avoid all worry. The baby too must be allowed to take exercise. He should be allowed to toss freely in a well ventilated room without covers, and should be allowed to cry as a form of exercise.

WILLIAMSON, New Orleans.

ROUTINE PROPHYLACTIC INJECTION OF WHOLE BLOOD IN THE NEW-BORN. ROY J. HEFFERNAN, New England J. Med. **207**:293 (Aug. 18) 1932.

An analysis of all available stastistics shows that for every 1,000 babies born alive, about 30 die during the first ten days. Postmortem examinations prove conclusively that intracranial hemorrhage is the chief cause of these deaths in the new-born. The incidence of intracranial bleeding, of some degree, in all new-born babies may be conservatively estimated at 20 per cent.

Rodda has shown that: 1. The average coagulation time in normal infants is seven minutes; the average bleeding time three and one-half minutes. 2. Prolongation of coagulation and bleeding times from the first day, increasing on the second, third and fourth and reaching a maximum on the fifth day, was observed in the majority of cases. It is significant that this coincides with the age incidence of cerebral hemorrhage and hemorrhagic disease. 3. Evidence of hemorrhage usually occurred when a prolonged bleeding time accompanied a prolonged coagulation time. 4. Delayed bleeding and coagulation times were favorably affected by the administration of whole blood.

Impressed by these observations, the author began four years ago as a routine procedure the administration of whole blood to every baby, immediately after delivery, whether normal or operative. The mother's elbow is scrubbed with alcohol and the infrascapular regions of the infant are rubbed with ether and painted with a 3.5 per cent solution of iodine. With a glass syringe, 20 cc. of blood is withdrawn from a vein in the mother's elbow and 10 cc. injected on

each side into the loose tissues under the infant's scapulas. The needle puncture is sealed with collodion and a gauze dressing applied.

Analysis of all the cases reported reveals an extremely low incidence of intracranial hemorrhage in normal full term infants not subjected to severe trauma.

There was no case of hemorrhagic disease of the new-born in this series. Since completing this report the writer has seen one mild case of this disease, in which the infant recovered promptly following the second injection of whole blood.

The author believes that the administration of whole blood as a routine is a harmless procedure and seems to be of definite value in reducing the incidence of intracranial hemorrhage and other hemorrhagic conditions of the new-born.

GENGENBACH, Denver.

ANEMIA IN THE NEW-BORN. GILBERT DALLDORF and HOLLIS K. RUSSELL, New York State J. Med. **32**:839 (July 15) 1932.

A male infant weighing 6½ pounds (2.9 Kg.) was found to be jaundiced at birth. He was "extremely pale yellow." The mother, aged 30, had had three previous pregnancies; two had resulted in abortions and one in a miscarriage. Except for erysipelas at the fourth month, this pregnancy was normal. A few purpuric spots were noticed on the second day, and the liver and spleen were enlarged and palpable. As the jaundice cleared up on the twelfth day, marked pallor was noted. On the sixth day the blood count showed 1,250,000 erythrocytes, 19,100 leukocytes and 30 per cent hemoglobin.

The child was given injections of blood intramuscularly and a transfusion. On the twelfth day, 1,130,000 erythrocytes were found, with 23,800 leukocytes and 35 per cent hemoglobin. The improvement in the blood picture continued, and at 3 months, 4,530,000 erythrocytes, 12,450 leukocytes and 70 per cent hemoglobin were found.

The author considered that the white blood count and differential count were within normal for the child's age.

Examinations of the stools and the urine and fragility tests gave negative results; the coagulation time and the bleeding time were normal. The cultures of the blood were negative; diagnosis was primary congenital anemia, probably due to some nutritional deficiency.

AIKMAN, Rochester, N. Y.

A STUDY OF THE DEEP AND SUPERFICIAL REFLEXES OF THE NEW-BORN. JOHN H. NOLAN, New York State J. Med. **32**:968 (Aug. 15) 1932.

The deep and superficial reflexes were found to be present in thirty-three newborn children. The plantar reflex was examined in six cases of breech presentation before the head was delivered, and was obtained in all more frequently than dorsal flexion. The patellar reflex could not be obtained on these six children before birth.

AIKMAN, Rochester, N. Y.

SCLEREMA NEONATORUM. KENNETH H. TALLERMAN, Proc. Roy. Soc. Med. **25**:788 (April) 1932.

An infant of 10 weeks was admitted to the hospital because the general nutrition was poor and because of hard lumps which had developed on the forearms and the right cheek. The swellings were oval with an irregular edge, raised, nodular and deep in the skin, but apparently attached to it.

WILLIAMSON, New Orleans.

INDURATION OF THE SKIN IN THE NEW-BORN. H. SLOBOSIANO, Nourrisson **20**:197 (July) 1932.

Induration of the skin of the face often follows trauma due to the pressure of forceps blades. Such induration may cause pain when the infant tries to nurse and a refusal of food. Indurations of the skin over the trunk or extremities

are more likely to be caused by a chilling of the cutaneous surface at or shortly after birth. The fatty acids (oleic, palmitic and stearic) of the subcutaneous tissue in the new-born are present in different proportions than in the adult; palmitic acid accounts for 29 per cent of the fat of the new-born as compared with 8 per cent in the adult. The water content of the subcutaneous tissue is much higher in the new-born than in the older infant or adult. These factors render the skin of the new-born much more susceptible to the effects of exposure to cold, and more prone to develop indurations.

McCLELLAND, Cleveland.

DYSCHRONDROPLASIA AS MANIFESTED BY EXOSTOSES THROUGH FIVE GENERATIONS OF A SINGLE FAMILY. M. SCARZETTA and M. REVIGLIO, Riv. di clin. pediat. **30**:1029 (Aug.) 1932.

A family tree is given through five generations; thirty-nine members could be traced. Of these, thirty-two, or 82 per cent, showed definite exostoses. The authors examined five members of the family; reports of the physical and roentgenologic examinations are given. One of the members showed sympatheticotonia.

HIGGINS, Boston.

HEMORRHOIDAL NODULES IN THE NEW-BORN FOLLOWING BREECH DELIVERY. V. SPERLING, Arch. f. Kinderh. **97**:104 (July 22) 1932.

The author states that of thirty-eight new-born infants born by breech delivery, eight showed perineal and perianal hemorrhoidal nodules which completely disappeared in two or three days. He believes this condition is analogous to cephalohematoma.

LEMASTER, Evanston, Ill.

A CASE OF EXFOLIATIVE DERMATITIS AND PEMPHIGUS. HANS ASPERGER, Arch. f. Kinderh. **97**:167 (Sept. 9) 1932.

The author cites the case of a premature infant with a disorder of the skin diagnosed as dermatitis exfoliativa of Ritter and its transition after a few days into a typical picture of pemphigus. It is maintained that these two conditions are associated.

LEMASTER, Evanston, Ill.

EXHUMATION OF NEW-BORN INFANTS. G. STRASSMANN, Beitr. z. gerichtl. Med. **11**:36, 1931.

Strassmann believes that autopsies on exhumed new-born infants may occasionally reveal whether or not the infant lived and whether it died from birth trauma or from natural causes. The Gram-Weigert and sudan stains are especially valuable in demonstrating inhaled amniotic fluid.

SAPHIR, Chicago. [ARCH. PATH.]

LARYNGEAL WOUNDS IN THE NEW-BORN INFANT DUE TO ATTEMPTS AT REVIVAL. A. FELLER, Beitr. z. gerichtl. Med. **11**:150, 1931.

In two instances, endolaryngeal wounds in asphyxiated new-born infants were produced by the introduction of tracheal catheters for the purposes of revival. In each instance the trauma was in the anterior wall of the larynx corresponding to the ligamentum conicum. The autopsy also disclosed subcutaneous emphysema, which extended into the mediastinum. One of the infants revealed, in addition, bilateral pneumothorax.

SAPHIR, Chicago. [ARCH. PATH.]

DESQUAMATION OF THE BRONCHIAL EPITHELIUM IN NEW-BORN AND YOUNG INFANTS. K. WALCHER, Deutsche Ztschr. f. d. ges. gerichtl. Med. **18**:305, 1931.

It is well known that cell elements that invest various inner surfaces of the body, such as the genito-urinary tract, pericardial and abdominal cavities, etc., fall

off soon after death, often in large numbers. This phenomenon is observed in the bronchi and bronchioli of new-born infants and of children in the first few years, while leukocytes are totally absent. This cadaveric desquamation must be distinguished from intravital desquamation. The latter is termed desquamative bronchitis and consists of accumulations of detached ciliated epithelial cells, while mucus and leukocytic elements are sparsely present. Since desquamative bronchitis and bronchiolitis may lead to the sudden death of an infant, they possess medicolegal significance. The etiologic factors are not yet sufficiently determined; there are, however, instances in which, besides marked hyperemia of the bronchial mucosa, innumerable bacteria (particularly pneumococci), as in a pure culture, are found. Lobular atelectasis, acute alveolar or interstitial emphysema and aspiration of the ciliated epithelium into the deeper portions of the lung down into the alveoli may occur as complications of desquamative bronchitis.

MILOSLAVICH, Milwaukee. [ARCH. PATH.]

SIGNIFICANCE OF FOREIGN MATERIAL IN THE INTESTINES OF THE NEW-BORN INFANT IN PROVING INFANTICIDE. K. BEOETHY, Deutsche Ztschr. f. d. ges. gerichtl. Med. **19**:58, 1932.

If a dead body is submerged, water or other fluid mediums may arrive in the stomach, but will not pass the pyloric barrier, except in instances of abnormally high pressure. Presence of water or other fluid with foreign material suspended in it, below the pyloric ring, is a positive indication that the person was submerged while still alive. Experiments performed on twelve dead bodies of new-born infants proved this important fact.

MILOSLAVICH, Milwaukee. [ARCH. PATH.]

DEVELOPMENT OF CHILDREN BORN AFTER TEMPORARY ROENTGEN STERILIZATION OF THE MOTHER. H. NAUJOKS, Strahlentherapie **37**:572 (Aug. 9) 1930.

Reports are given of six children born of mothers who had been temporarily sterilized with roentgen rays. There was no definite proof of roentgen injury in any of the cases, though there were anomalies in some of the children. The first child had a disturbance in speech, which seven years ago was a distinct stuttering, but now is only a slight lisp; it may be due to adenoids. It hardly seems probable that this anomaly was caused by roentgen injury. The children in the second and third cases were born after a long period of sterility, and neither of them showed any evidence of roentgen injury. In the fourth case the mother was amenorrheic for two years and then menstruated for four years before she became pregnant. The child was normal up to his death at 2 years of age from bronchopneumonia. In the first case the child had retarded physical and psychic development, but it may have been due to rickets and the very bad conditions under which he lived. There has recently been an improvement. The child is now 3¼ years old, but the mother says there still are signs of inferiority. It is very hard in this case to say whether or not the injury was caused by the rays. The sixth child is obese and has neuropathic symptoms. But obesity in this instance is a family trait. The patient's vision is normal, and there were no pathologic findings in the eyegrounds. To decide the question of roentgen injury definitely, all such children should be carefully examined and followed up with the cooperation of pediatricians and students of heredity.

MORGAN, Washington, D. C. [AM. J. ROENTGENOL.]

REACTION OF THE BLOOD PLASMA OF THE MATERNAL BODY AND THE NEW-BORN TO SILVER. M. IKEDA, Jap. J. Obst. & Gynec. **15**:102 (April) 1932.

Ikeda states that a marked difference exists between the blood plasma of the mother and of the new-born infant. He demonstrated this difference by using the silver reaction of Oettingen. A heavy precipitate was produced in the blood plasma of the new-born. This precipitate is never produced in the maternal blood.

He further concludes that the silver reaction is caused by a "kind of substance" which only the blood of the new-born contains and which disappears from the blood plasma when coagulation of the blood begins to take place.

MICHEL and ADAIR, Chicago.

EFFECT OF PROPHYLACTIC THYROID THERAPY ON THE NUMBER OF STILLBORN INFANTS IN THE CLINIC AND POLICLINIC AT LEYDEN. H. VAN DER HOEVEN, Nederl. tijdschr. v. geneesk. **76**:143 (Jan. 9) 1932.

Intoxication during pregnancy can be almost entirely prevented by prescribing tabloids containing thyroid, after which the urea standard of the blood reaches more than 150 mg. per liter (determined by the method of Van Slyke and Cullen), while the maximum blood pressure is more than 100 mm. of mercury.

It is by this method that the number of stillborn infants in the clinic and policlinic in Leyden was reduced from 3.3 per cent to 1.08 per cent.

VAN CREVELD, Amsterdam, Holland.

ICTERUS IN NEW-BORN INFANTS. J. C. SCHIPPERS, Nederl. tijdschr. v. geneesk. **76**:2898 (June 11) 1932.

This article is a review of the kinds of jaundice in the newly born. Examination of the blood, urine and stools is necessary. The difficulty in making an exact diagnosis is shown by a report of a number of cases. To make a diagnosis, microscopic examination of the liver is necessary.

VAN CREVELD, Amsterdam, Holland.

Acute Infections

DERMATITIS GANGRAENOSA INFANTUM IN THE COURSE OF SCARLET FEVER. HARRY D. PASACHOFF and NATHAN SOBEL, Arch. Dermat. & Syph. **26**:428 (Sept.) 1932.

A case of dermatitis gangraenosa infantum complicating scarlet fever is reported. In this case of a 5 year old boy, numerous pustular lesions appeared over various parts of the body. Areas of gangrene of the skin followed the pustules. This complication occurred on the twenty-first day of the scarlet fever. The boy recovered in three months. The authors review the literature written concerning this rare complication. They also discuss the various possible causative factors. They favor the possibility that it is a clinical manifestation of local cutaneous reactivity similar to that described by Shwartzman (*J. Infect. Dis.* **48**:183 [Feb.] 1931).

EKERMEYER, Iowa City.

AN ELABORATION OF THE SPINE SIGN IN POLIOMYELITIS. CHARLES ROSENBERG, Arch. Pediat. **49**:705 (Oct.) 1932.

The writer feels that the best procedure for eliciting the spine sign in an older child is to take the child out of bed and direct him to bend over and touch his toes, without bending his knees. If poliomyelitis is present, the patient is unable to touch his toes, or does so with great difficulty.

WADDELL, University, Va.

TEMPERATURE AND PRECIPITATION IN RELATION TO THE MORBIDITY RATE OF POLIOMYELITIS. JOHN A. TOOMEY and MYRON H. AUGUST, J. Pediat. **1**:601 (Nov.) 1932.

Fifteen cities of the United States were studied to determine whether the incidence of poliomyelitis was affected by the average atmospheric temperature or amount of rainfall occurring during the spring months of recent years. No correlation could be demonstrated.

LEMASTER, Evanston, Ill.

ACUTE ANTERIOR POLIOMYELITIS. JESSE R. GERSTLEY, M. Clin. North America **16**:517 (Sept.) 1932.

Gerstley reviews the history of acute anterior poliomyelitis and summarizes later ideas concerning its etiology and immunology. He feels that gratifying progress has been made in treatment. Diagnosis in the preparalytic stage is a prerequisite of the successful use of convalescent serum. In the center for serum treatment with which he is connected, of eighteen patients treated in this stage, seventeen recovered; of fourteen patients seen early in the stage of paralysis, ten showed no further progression. The custom of the author and his associates is to give 20 cc. of pooled convalescent serum intraspinally and 60 cc. intramuscularly. The dose is occasionally repeated the next day. Following the use of serum there may be an intensification of the meningeal symptoms during the succeeding twenty-four hours. If convalescent serum is not available, adult whole blood, preferably from more than one donor, may be given into a muscle.

SMITH, Ogden, Utah.

ESTABLISHMENT OF IMMUNITY IN SOME INFECTIOUS FEVERS. JOHN BROADBENT, Lancet **2**:823 (Oct. 15) 1932.

This article is a general review of the knowledge of diphtheria and scarlet fever immunization. As regards scarlet fever the author concludes that "universal immunization in the present state of our knowledge is not a practical proposition, but such success has already been attained in the protection of those exposed to infection in fever hospitals that it may be feasible in the near future.

"One word of warning. If these diseases are abolished as the results of what one may term 'artificial immunisation,' this must be maintained indefinitely."

LANGMANN, New York.

ALUM-TOXOID AS AN IMMUNISING AGENT AGAINST DIPHTHERIA. J. C. SAUNDERS, Lancet **2**:1047 (Nov. 12) 1932.

Alum toxoid produced by the addition af aluminum sulphate to a diphtheria toxoid was found to be superior to toxoid-antitoxin in that it produced immunity more rapidly.

LANGMANN, New York.

METHOD OF ACTIVE IMMUNIZATION BY DIPHTHERIA ANATOXIN. G. RAMON, Bull. Inst. Pasteur **30**:1 (Jan. 15) 1932.

This study is concerned principally with three points: (1) the harmlessness of the method, (2) its efficacy and (3) the conditions for practical realization.

1. The principal factor in the harmlessness of anatoxin is the total absence of diphtheritic poison, so that it is incapable of producing the symptoms of specific intoxication that are produced by the smallest doses of diphtheria toxin injected subcutaneously. The author points out that all antigenic substances may produce local or general reactions in some persons, and anatoxin does not escape from this general rule. The results of millions of injections, given not only in France but also in other countries, have affirmed the innocuousness of that antigen.

2. The efficacy of this method has been shown by the results reported from various countries; for instance, 250 subjects were tested four years after the injections were made, and 96.4 per cent were found to have a negative reaction to the Shick test. Patients' serum was also taken to test the value of the antitoxin. Many observations are quoted, and Ramon summarizes by stating that the efficacy of this material as it has been studied for eight years leaves no doubt of the actual superiority of the anatoxin.

3. The conditions of practical realization are of two kinds, those which concern the vaccine and those relative to the application of the method. The antigen used as the vaccine is easily prepared; the control of its innocuousness is simple, and

the estimation of its activity can readily be made. It is also very stable in its innocuousness, and its production is economical.

Conclusions adopted by the Committee of Hygiene of the Faculty of the Nations, In June, 1931, in London are given. In brief, it is stated that the anatoxin is of great value in reducing the mortality and morbidity from diphtheria, and that the use of subcutaneous injections is recommended, three injections being given with an interval of three weeks between the first and the second and one of at least two weeks between the second and third.

HAYS, Ann Arbor, Mich.

ALLERGIC REACTIONS CAUSED BY ANATOXIN. E. AUBERTINE and P. BOUDOU, Paris méd. **2**:393 (Nov. 12) 1932.

The authors report the case of a young man, 21 years of age, who had a moderate attack of tonsillar diphtheria. In error, he received 150 cc. of anatoxin subcutaneously instead of diphtheria antitoxin. The mistake was not discovered until after he had recovered. He complained only of pain around the point of injection. The authors have gathered most of the collected reports of reactions to anatoxin in the French literature. These vary from hyperpyrexia and malaise to hematuria and paralysis in three cases. They believe that the fact that the administration of a massive amount of anatoxin had so slight an effect on a patient who should have been in a very receptive state for a reaction, as he was suffering from diphtheria at the time, indicates that any reaction to anatoxin is purely allergic.

SANFORD, Chicago.

PATHOGENESIS OF INTESTINAL HEMORRHAGE IN TYPHOID FEVER IN CHILDREN. T. GUGLIELMINI, Prat. pediat. **10**:265 (June) 1932.

The author describes the course of typhoid infection in an 8 year old child who died of hemorrhage, perforation and peritonitis on the twenty-fourth day of illness. He then reviews the standard literature on the subject without making any original contribution.

DOOLEY, Kent, Conn.

MENINGO-ENCEPHALITIS SIMULATING PSEUDOTUBERCULOSIS AT THE BEGINNING OF PERTUSSIS. JOSÉ BONABA and F. NICOLA REYES, Arch. de pediat. d. Uruguay **3**:263 (June) 1932.

The case occurred in a male child 8 years old. A diagnosis of tuberculous meningitis had been made. The development of frank pertussis cleared up the case. The authors believe that the meningeal symptoms were due to an early development of encephalitis in a case of pertussis.

The beginning of severe paroxysmal attacks coincided with a regression of the meningo-encephalitic symptoms. These disappeared entirely while the pertussis continued, with its usual course and evolution.

SCHLUTZ, Chicago.

NASAL DIPHTHERIA IN CHILDREN. SUSANNA GEZELD, Arch. f. Ohren-, Nasen- u. Kehlkopfh. **132**:1 (July 23) 1932.

Gezeld states that the epidemics of diphtheria which occasionally occur in children's wards, especially the contagious wards, usually affect chiefly the nose and are started by the admission of a child with undetected latent nasal diphtheria. Nasal diphtheria occurs most frequently in children under 5 years of age; the largest percentage of cases falls among nurslings. In addition to the typical membranous form, the disease may assume a catarrhal or an erosion form. In the diagnosis of nasal diphtheria, bacteriologic examination should be employed in addition to rhinoscopy. Involvement of the nasal sinuses in cases of diphtheritic infection of the nose is not rare. The duration of the nasal infection depends on the peculiarities of local and general immunity. The author recommends treatment with frequent small doses of antitoxin combined with local therapy.

EDITOR'S ABSTRACT. [ARCH. OTOLARYNG.]

INTRACUTANEOUS VACCINATION FOR SMALLPOX. K. SCHEER, Monatschr. f. Kinderh. **54**:274, 1932.

The intracutaneous technic of vaccination was tried in 135 children, varying in age from 6 to 24 months, over a period of three years. The results were entirely unsatisfactory, with unpleasant local complications, general systemic disturbances and exanthems and decided constitutional reactions. In only 50 per cent of the cases was the reaction mild.

GERSTLEY, Chicago.

INTRACUTANEOUS VACCINATION FOR SMALLPOX. KARL KUNDRATITZ, Monatschr. f. Kinderh. **54**:282, 1932.

An extensive review of the literature is given, with much argumentation in favor of the method. It avoids the formation of pustules, prevents secondary infection, avoids a scar, gives a mild constitutional reaction and, in short, accomplishes everything which Scheer, in the previous article, maintains that it does not do.

GERSTLEY, Chicago.

INTOXICATION SYNDROME IN PERITONITIS AND COLI SEPSIS IN CHILDHOOD. HILDE BRUCH, Monatschr. f. Kinderh. **54**:305, 1932.

The cases of six patients, varying in age from 1¾ to 4¾ years and presenting the typical picture of alimentary intoxication, are described. Five of the cases proved to be peritonitis and the sixth, coli sepsis. All of the patients showed definite dehydration and the syndrome of alimentary intoxication. The symptoms are in accord clinically with the experimental work of Bessau and Rosenbaum, who maintain that this syndrome is a combination of dehydration plus bacterial toxins. Diagnosis was made difficult by the absence of almost any signs of peritoneal irritation. This may have been due to the semicomatose condition. The child with coli sepsis recovered; the others died.

The reviewer believes that these cases belong to the same series as those described by Saphir and Wile from the Michael Reese Clinic, under the name of "migratory peritonitis."

GERSTLEY, Chicago.

IMMUNIZATION AGAINST DIPHTHERIA WITH THE LÖWENSTEIN METHOD. THOENES, Monatschr. f. Kinderh. **54**:337, 1932.

A study was made of seventy-two children, varying in age from 2 to 10 years, who were immunized with the cutaneous method of Löwenstein. While the method unquestionably increases the antibodies in the blood, in only about 60 per cent of the cases did an appreciable immunity develop. For some reason, children recuperating from scarlet fever seemed the most difficult to immunize.

GERSTLEY, Chicago.

SUSCEPTIBILITY TO SCARLET FEVER AND BLOOD GROUPING. HERBERT NOWAK, Monatschr. f. Kinderh. **54**:343, 1932.

In previous studies, the author showed that in persons with group A blood, less immunity developed following diphtheria than in persons of the other groups. He now repeated these observations in scarlet fever, both with clinical studies and with the Dick method. He concludes that persons with the blood group A are less susceptible and those with the blood group O are decidedly more susceptible to scarlet fever.

GERSTLEY, Chicago.

TREATMENT OF WHOOPING COUGH. L. VEILCHENBLAU, München. med. Wchnschr. **79**:402 (Aug. 26) 1932.

The author has found a simple form of treatment helpful in controlling the paroxysms and vomiting in whooping cough. He uses a mustard pack twice a

day, followed by a hot bath. The patient should perspire for an hour. The vomiting usually stops in three days and the paroxysms a few days later.

BRAHDY, Mount Vernon, N. Y.

TREATMENT OF DYSENTERY IN CHILDREN IN WARM CLIMATES. J. CASPARI, München. med. Wchnschr. **79**:420 (March 11) 1932.

Emetine hydrochloride, U. S. P., is usually strikingly effective in the treatment of dysentery in children. However, some patients have an idiosyncrasy to this drug. Not infrequently, a patient collapses after the first injection. In others, there are undesirable cumulative effects. The most serious reactions are those in which a child dies a few minutes or hours after the third or fourth injection. Caspari also thinks there are cases in which insidious cardiovascular failure occurs with death.

The administration of a flavine dye by rectum was suggested by Urchs for the treatment of dysentery. Caspari found that the treatment was simpler and just as effective when the drug was given by mouth. The author reports 182 cases from Palestine, in 95 of which the patient was under 1 year of age; the youngest patient was 5 weeks of age. The daily dosage of the flavine dye was 0.05 Gm., administered in an emulsion of castor oil and calcium carbonate.

The results were most encouraging. Two of the 182 patients died; 161 improved and were out of danger within four days. The condition was considered improved when the fever and toxemia subsided, sphincteric control was regained and the tenesmus disappeared. The general improvement was such that the patient was out danger even though there were frequent loose stools.

BRAHDY, Mount Vernon, N. Y.

RESULTS OF IMMUNIZATION WITH THE CONCENTRATED DIPHTHERIA ANTITOXIN OINTMENT OF LÖWENSTEIN. K. HASSMAN, München. med. Wchnschr. **79**:871 (May 27) 1932.

Löwenstein has made a more concentrated ointment for prophylactic immunization against diphtheria. He advises the use of 5 cc. for each inunction, instead of 3 cc. The inunctions are given three times at intervals of two weeks. Hassman investigated the duration of the immunity obtained with the concentrated ointment. Eighty children received a Schick test two weeks after their last inunction; fifty-seven gave a negative reaction. Five months after the last inunction, sixty-one of the children were retested. At this time, only thirty-five had a negative reaction. The reaction had become positive in ten children who had had a negative reaction after the interval of two weeks. Hassman advises that children receive an inunction of ointment every three months in order to maintain the percentage of those immune at the highest level.

BRAHDY, Mount Vernon, N. Y.

APPEARANCE AND SIGNIFICANCE OF BACTEREMIA IN DIPHTHERIA. T. U. SIMIČ, Zentralbl. f. Bakt. (Abt. 1) **120**:385, 1931.

In seven patients dying from diphtheria Simič recovered diphtheria bacilli from the blood of the heart or from the lungs, vena cava, spleen or pericardium. On the basis of experimental studies he concludes that the dissemination of the bacilli through the blood stream depends on their virulence and on their ability to grow and form toxin rapidly, as well as on the individual dispositions of the host. Vaccination of guinea-pigs with the anatoxin of Ramon protected against all strains of diphtheria bacilli in his possession.

CANNON, Chicago. [ARCH. PATH.]

IMMUNITY AGAINST DIPHTHERIA AMONG THE BLACK RACES. OTTO FISCHER, Ztschr. f. Immunitätsforsch. u. exper. Therap. **74**:244, 1932.

Among 283 natives of East Africa only 3 gave a positive reaction to the Schick test. This was explained by a relatively high titer of diphtheria antitoxin in the blood of those tested, being one-twentieth of a unit or more in 73 per cent of them.

DAVIDSOHN, Chicago. [ARCH. PATH.]

Chronic Infections

CHILDHOOD TUBERCULOSIS. E. HARRISON NICKMAN, M. J. & Rec. **134**:21 (July 1) 1931.

Tuberculosis of childhood is a distinct type, the result of a primary infection, whereas the adult type is the result of reinfection. Tuberculosis in childhood manifests itself by an original parenchymal and secondary tracheobronchial involvement of the lymph nodes, the pathologic picture varying with the stage of the disease. Transmission of the disease is generally from a member in the family group. The tuberculin test and roentgenogram are of great importance in the diagnosis of early tuberculosis in childhood, but even these are not conclusive in themselves. Prophylaxis consists principally of protecting the contact child. Fundamental treatment of all patients consists in building up the general health to the highest possible standard. Fresh air, sunlight, good food, rest and the elimination of foci of infection and of physical defects are important basic measures. The prognosis and type of treatment depend on the extent of the disease, the response of the individual patient and the age at which the disease is acquired.

WILLIAMSON, New Orleans.

THE PROPHYLAXIS AND TREATMENT OF CONGENITAL SYPHILIS. A. SÉZARY, Progrès méd., May 28, 1932, p. 956.

The author pleads for prophylaxis in treating syphilis before marriage and in early diagnosis in the new-born. This early treatment in the new-born would save many a child from numerous conditions that are caused by his arrested development.

SANFORD, Chicago.

TUBERCULOUS EPIDIDYMO-ORCHITIS IN THE CHILD. BERNARDO E. SAS, Arch. argent. de pediat. **3**:265 (May) 1932.

The author reports two cases of this comparatively rare condition in a boy 2 years old and another 20 months old. There was contact infection in both cases.

Small lesions in the testicles were the first manifestation. The increase in size was fairly rapid. In both cases markedly positive reactions to tuberculin were obtained. Biopsy revealed the true nature of the disorder.

The author points out that the lesion is easily overlooked, and its true nature not always suspected. Biopsy is the only certain diagnostic procedure. Medical treatment is generally successful and should first be tried before surgical intervention is employed.

SCHLUTZ, Chicago.

TUBERCULOUS INOCULATION WITH B C G. CARL RUPILIUS, Arch. f. Kinderh., supp. 1, 1931.

After a discussion of immunity and allergy in tuberculosis and of the manner and extent of tuberculosis in childhood, the author reports his findings with B C G in experimentation with animals and with a certain number of children. Believing that the oral administration of B C G is unreliable, he experimented with different amounts of B C G given parenterally. Although repeated large doses produced allergy and provided protection against virulent tubercle bacilli

in guinea-pigs, it was found that three or four smaller doses, of from 0.01 to 0.3 mg., repeated at intervals of from one to three days, were equally effective and produced much less disturbance at the site of injection and in the regional lymph nodes. Thirty-three children were given a series of small injections, most of them from 0.001 to 0.006 mg. of B C G. Of twenty patients observed for a sufficiently long time, seventeen became allergic to tuberculin. It is to be noted that more tuberculin, from 0.1 to 1 mg., was required to produce a reaction in the children studied than is needed in children who have an infection with virulent tubercle bacilli. The author believes that the allergy which developed in these children represents immunity. There was no evidence in either series of experiments that the B C G showed increased virulence. The study covers fifty-three pages and has an introduction by Dr. Franz Hamberger.

LESLIE, Evanston, Ill.

TUBERCLE BACILLEMIA IN CHILDHOOD. LASZLO VON DOBSZAI, Monatschr. f. Kinderh. **54**:266, 1932.

Using Löwenstein's technic, the authors made cultures of the blood of twenty-five patients, ill with various diseases. Only five of sixty-four attempts gave positive results. These cultures came from four patients with severe pulmonary or generalized tuberculosis. In no case of rheumatism or endocarditis could the organisms be recovered.

GERSTLEY, Chicago.

TREATMENT OF TUBERCULOUS MENINGITIS WITH DEEP ROENTGEN IRRADIATION. Z. BOKAY, Orvosi hetil. **76**:157 (Feb. 27) 1932.

The diagnosis of tuberculous meningitis, according to present knowledge, actually means a death sentence for the patient. In view of this fact, any form of heroic treatment seems to be justified. Bokay tried intensive treatment with deep roentgen irradiations. At one time not more than from 250 to 300 roentgens was given. The irradiation was repeated daily, and overlapping areas were exposed. The diagnosis in all cases was made definite through finding the acid-fast organisms in the cerebrospinal fluid. Of seventeen patients five recovered and twelve died. Although the results are not satisfactory, they are much better than can be expected from any other method of treatment of tuberculous meningitis. The author therefore urges the use of this treatment in every instance of the disease.

ZENTAY, St. Louis.

MALARIAL TREATMENT OF CONGENITAL SYPHILIS BY CONTROL OF THE BLOOD PICTURE. P. KISS and G. PEIERBERGER, Orvosi hetil. **76**:313 (April 16) 1932.

The authors treated eight children with congenital syphilis by inoculation with malaria as suggested by Wagner-Jauregg. The main purpose of their work was to determine how many febrile attacks can be permitted to occur without any serious damage to the child. For this purpose they followed the blood picture closely. One child had nine attacks; two of them had eight; three had seven, and two had five. In the blood picture they found the following changes:

1. The red blood count decreased with the repeated attacks. In an extreme case, after the seventh attack it was decreased 50 per cent. 2. The hemoglobin also decreased, in the extreme cases, as low as 47 per cent. 3. The white blood count decreased considerably after the first attack, this decrease ranging between 50 and 70 per cent. 4. There is a relative increase of the neutrophils during the attack. In the periods between attacks, a relative lymphocytosis can be found. The eosinophils develop two or three days after the febrile attacks.

In view of this marked destruction of the blood, malarial treatment of congenital syphilis has to be carried out under proper control of the blood picture. The number of attacks permitted to develop should be regulated according to the process seen in the blood.

ZENTAY, St. Louis.

Internal Diseases

THE COURSE OF CONGENITAL KIDNEY PROBLEMS IN INFANCY. I. NEWTON KUGELMASS, Arch. Pediat. **49**:201 (April) 1932.

A plea for the early diagnosis of congenital disease of the kidneys is made. The author feels that unless early diagnoses are made, therapeutic procedures will be of little avail. With the advent of intravenous pyelography, infants may now be given the advantage of early diagnosis of congenital renal disturbances. Some of the common congenital conditions of the kidneys are presented, with the clinical findings present from birth. A case of polycystic kidney, one of malignant tumor of the kidney and one of congenital hydronephrosis are reported in detail.

WADDELL, JR., University, Va.

THE SCHILLING HEMOGRAM: ITS APPLICATION IN PEDIATRICS. SYDNEY NUSSBAUM, Arch. Pediat. **49**:207 (April) 1932.

The writer feels that the application of the Schilling method of study of the blood is a valuable aid in the establishment of the presence of infection in pediatric cases, and that repeated examination of the blood by this method is of distinct prognostic value. A detailed interpretation of the Schilling hemogram is given, and a study of 232 pediatric cases, with 432 hemograms, is presented. This series of cases includes instances of practically all the common pediatric conditions as well as of a few contagious diseases. The article does not lend itself to abstracting, and should be read.

WADDELL, JR., University, Va.

APUTRID PULMONARY NECROSIS: A COMPLICATION OF PNEUMONIA. MORRIS GLEICH, Arch. Pediat. **49**:258 (April) 1932.

A case of aputrid pulmonary necrosis occurring in a 4 year old child is reported. Pathologically, the cavitation results from a thrombosed vessel supplying a portion of a pneumonic lung. Following thrombosis the blood supply to that part of the lung is cut off, anemic infarction occurs, and necrosis and cavitation result. One unfamiliar with aputrid necrotic cavitation might interpret the condition as pulmonary abscess or tuberculosis. It is, therefore, advisable to bear this complication in mind.

WADDELL, JR., University, Va.

THE INCIDENCE OF RESPIRATORY INFECTIONS DURING THE FIRST FIVE YEARS OF LIFE. C. C. MCLEAN, Arch. Pediat. **49**:279 (May) 1932.

"1. An intensive study of 1,408 respiratory infections seen in 156 children is made in an endeavor to find evidence of a periodic recurrent disease.

"2. A small number of children are reported rather than a large group, so as to include only patients with whom we have been in intimate contact and feel reasonably sure were seen in practically all illnesses.

"3. A comparison of the average number of respiratory infections per patient and the average number of months per each respiratory infection in the children with various groupings of the same age and length of observation, shows a marked consistency.

"4. During an exact period of four years from the date of birth in 86 and 70 children, 692 and 563 respiratory infections were seen. The average numbers of days between infections in the two series were 181.4 and 181.5 days. The average number of respiratory infections per patient in each series was 8.04 infections. The per cent of mild and severe infections in the two series was the same, 41 per cent mild and 59 per cent severe.

"5. Eight hundred forty-five respiratory infections were seen in 86 children observed for an exact period of five years from date of birth. The children were placed in two groups of 43 patients, one group having 416 infections, the other 429, a difference of 13 infections.

"6. In 70 children observed for an exact period of four years from date of birth, 563 respiratory infections were seen. The patients were placed in two groups of 35 children, one group having 285 infections and the other 278, a difference of seven infections.

"7. In 140 children observed for an exact period of four years from date of birth, 1,125 respiratory infections were seen. When the patients were placed in two groups of 70 children, one group had 563 infections and the other 562, a difference of one infection.

"8. The monthly seasonal incidence of occurrences in 845 respiratory infections seen in 86 children observed for an exact period of five years from date of birth, compared with 563 respiratory infections seen in 70 children over an exact period of four years from date of birth, shows a marked consistency.

"9. The removal of tonsils and adenoids apparently had little effect on either the number or severity of respiratory infections.

"Conclusion: The consistency in the sameness of the total number of respiratory infections seen in various groupings of children of the same age, number and length of observation shows evidence of a periodic recurrent disease."

WADDELL, University, Va.

CHRONIC JUVENILE HYPOPARATHYROIDISM. A. CANTAROW, Arch. Pediat. **49**: 293 (May) 1932.

Two cases of chronic juvenile idiopathic tetany are reported in which treatment with vitamin D and calcium over periods of two and three years was unproductive of permanent benefit. The administration of calcium and of parathyroid hormone resulted in prompt symptomatic relief and eventually in complete disappearance of all manifestations of tetany. The findings in these cases support the view that infantile tetany is dependent primarily on a state of vitamin D deficiency and that chronic idiopathic tetany not associated with rickets is due to hypoparathyroidism. The writer points out that the metabolic features of these two conditions are diametrically opposed, vitamin D deficiency being characterized by diminished and parathyroid deficiency by increased calcium and phosphorus retention. Hyperphosphatemia does not occur in uncomplicated infantile tetany, but is rather indicative of hypoparathyroidism. Vitamin D and calcium therapy acts as a specific curative measure in infantile tetany, and parathyroid and calcium therapy has a specific curative rôle in hypoparathyroid tetany. No permanent benefit can result from the use of parathyroid extract in infantile tetany or from vitamin D in hypoparathyroid tetany. Bad effects may possibly be produced by the prolonged administration of viosterol to persons with hypoparathyroidism.

WADDELL, University, Va.

AN ADRENALIN (EPINEPHRINE) CHLORIDE TEST. MARTIN M. MALINER, Arch. Pediat. **49**:305 (May) 1932.

Sixty-two children from the children's cardiac outpatient department of the New York Postgraduate Medical School and Hospital were studied in an attempt to distinguish between organic and functional murmurs by the use of epinephrine administered subcutaneously. This group of children were given subcutaneous injections of epinephrine chloride in a 1:1,000 solution into the left arm about two hours after breakfast. The amount of epinephrine injected varied from 3 minims (0.18 cc.) in the seriously ill patients to 12 minims (0.72 cc.), the average being about 8 minims (0.5 cc.). Following these injections the heart sounds and murmurs, with their locations and transmission, and the blood pressure and pulse rate were recorded. These observations were recorded every two hours until five minutes before the time that conditions returned to normal. The cases were divided into three separate groups: (1) those with a definite diagnosis; (2) those with an uncertain diagnosis, and (3) four control cases supposed to be noncardiac. The writer believes that injections of epinephrine are very useful in differentiating

between organic and functional murmurs. Epinephrine chloride in a 1:1,000 solution in doses of approximately from 0.01 to 0.15 mg. per pound (0.5 Kg.) of body weight in children with possible chronic valvular disease apparently serves to: (1) intensify the normal sounds of the heart; (2) intensify the murmurs of valvular lesions; (3) localize these murmurs to their respective values; (4) cause a disappearance of nonpathologic murmurs, or to tend to localize them to a functional area; (5) reveal valvular lesions of supposedly cured patients and be useful before discharging a patient, and (6) cause an initial weakness of heart sounds and murmurs in those patients who have a myocardial weakness.

WADDELL, University, Va.

INTESTINAL DISTURBANCES IN INFANCY DUE TO ALLERGY. CARROLL M. POUNDERS, Arch. Pediat. **49**:314 (May) 1932.

Certain cases of intestinal disturbances during infancy and early childhood have been and continue to be troublesome to correct. The author refers to cases, both in breast-fed and in bottle-fed babies, in which the food seems to be of the right amount and proper quality, is well taken and generally produces a satisfactory gain in weight, but the baby appears to have much intestinal discomfort, sleeps badly, possibly spits more than he should and has several loose, irritating bowel movements each day. The writer feels that many times such patients are sensitive to the protein of fresh cow's milk. Two cases of this nature are reported. He thinks that such troubles are most likely to occur in babies with parents with a history of allergy, and feels that most of these babies do satisfactorily on a preparation of milk that has been "denaturized," i. e., heated, evaporated or dried. The natural tendency is to establish eventually a tolerance for the disturbing protein.

By way of prophylaxis, a pregnant woman who has a family or a personal history of allergy should not be given unusual amounts of milk or of any other single food for long periods. Babies with allergic backgrounds should be given cow's milk cautiously and in the beginning should be given small amounts of cow's milk that has been naturized by heating, evaporation or drying.

WADDELL, University, Va.

"PERNICIOUS" BLOOD PICTURES IN INFANCY. THOMAS B. COOLEY and PEARL LEE, J. Pediat. **1**:184 (Aug.) 1932.

The authors report and discuss the cases of eight infants in whom the blood picture resembled pernicious anemia. The histories indicated iron deficiency as the cause of the anemia. Recovery from the anemia and disappearance of abnormal red cells were rapid after one or two small blood transfusions, followed by an adequate diet. The blood showed characteristically a high percentage of macrocytes and a high color index. In addition, there were poikilocytosis, some microcytosis, polychromatophilia and always nucleated red cells. Three patients showed leukopenia and two leukocytosis. It is suggested that blood pictures of this kind are indicative of some deficiency which prevents the production of enough mature cells and causes an outpouring of unripe forms.

LEMASTER, Evanston, Ill.

THE ADDIS SEDIMENT COUNT IN CHILDREN. WILLARD B. REW and ALLAN M. BUTLER, J. Pediat. **1**:216 (Aug.) 1932.

Addis urine sediment counts were made on sixteen normal children, sixteen children with acute infections and six children with Bright's disease. This method consists of counting the cells and casts passed in a twelve hour specimen of urine obtained after a prescribed period of restricted fluid intake. The authors modified the Addis technic by shortening the dehydrating foreperiod and by using brilliant cresyl blue to differentiate the types of cells. The cast counts in the normal children were found appreciably higher than normal adult counts. No significant increase in urinary sediment was observed in children with acute infections without dehydration.

LEMASTER, Evanston, Ill.

RENAL RICKETS. E. APERT, Nourrisson **20**:159 (May) 1932.

To the seventy-eight cases of renal rickets reported by Mitchell (AM. J. DIS. CHILD. **40**:101 [July] 1930) the author adds seven other cases. More cases have been reported from England than from any other country. Syphilis is not an important etiologic factor. The characteristic features of the disease are the nanism accompanied by the usual blood and urinary changes of nephrosclerosis. The roentgenograms show osseous changes similar to those occurring in the usual infantile rickets. Examination of the blood reveals hypocalcemia and hyperphosphatemia with mild acidosis which combats any tendency to tetany. Treatment is for the underlying renal disease. The effects of the treatment with ultraviolet radiation and with viosterol have been disappointing.

McCLELLAND, Cleveland.

THE RÔLE OF COPPER IN ANEMIA OF INFANCY. E. GORTER, F. GRENDEL and W. A. M. WEYERS, Rev. franç. de pédiat. **7**:747 (Dec.) 1931.

The authors first analyzed the amount of copper in specimens of fresh cows' milk. Expressed in milligrams per fifty cubic centimeters the average content was 0.125. The same milk after pasteurization contained 0.22 mg. Certain specimens had as high a content as 0.29 mg. after pasteurization in the usual copper vessels. Goats' milk contains 0.13 mg. of copper, exactly the same as cows' milk. Yet goats' milk causes alimentary anemia. Human milk has on an average 0.25 mg. of copper, a value no higher that that of pasteurized cows' milk. When the amount of copper in various preparations of iron was studied, the quantity varied from 0.005 mg. in lactate of iron to 0.6 mg. in pulverized iron. Experiments intended to test the efficacy of these preparations were not successful. Finally, the actual quantity of copper in the blood was estimated in four groups of infants and in a group of six pregnant women. In new-born infants the copper content averaged 1 mg.; in convalescent patients, 1.4 mg., in those with infectious diseases, 2.1 mg., and in those with anemia 2.1 mg. The average for the pregnant women was 1.9 mg. In patients with anemia the hemoglobin averaged from 29 to 55 per cent, and the red cells from 1,360,000 to 5,000,000 (i. e., hemoglobin 47 per cent). One of the infants aged 14 months, who had been fed exclusively on cows' milk and farina had 2.75 mg. of blood copper. The authors conclude, therefore, that the existence of nutritional anemia, caused by deficiency of copper has not been shown by their experiments.

SANFORD, Chicago.

ENURESIS. A. BRETSCHNEIDER, Arch. f. Kinderh. **94**:305 (Oct. 23) 1931.

Three cases are presented in which varying psychologic factors are thought to be the basis of the enuresis.

LESLIE, Evanston, Ill.

ESOPHAGEAL SPASM IN INFANTS AND CHILDREN. MARIA SUDHUES, Arch. f. Kinderh. **96**: 65, 1932.

The author has brought together the literature on esophageal spasm and presents four cases of her own. The cases divide themselves into two groups: (1) those occurring secondarily to an injury or inflammation of the esophagus (these conditions are not to be confused with a narrowing from scar tissue, but are a true spasm of reflex nature) and (2) those occurring as a primary spasm. The latter are probably due to a congenital defect in the vegetative nervous system, with a disturbance in the vagus or the intermuscular plexus of the esophagus. Occasionally the spasm may be central in origin; one case is cited in which there was hemorrhage in the medulla oblongata. Ylppö and Tagmiyas and Reeders have reported a group of cases of a condition designated as "cardiospasm with dilatation of the oesophagus," in which an injury to the vagus, shown by anatomic studies, was thought to interfere with the opening reflex of

the cardia. The primary spasm occurs exclusively in the lower third of the esophagus. In the early years of life it is much more frequent in males than in females. It is often associated with congenital inferiority, one of the author's patients being a mongolian idiot. Psychic factors should be considered in the etiology and treatment. The author believes that esophageal spasm is a more common cause of vomiting in infants and young children than has previously been thought, and that more extensive investigation by means of the fluoroscope would reveal this to be the case.

LESLIE, Evanston, Ill.

DIAGNOSIS OF CYSTIC LUNGS. CARL MUMME, Deutsche med. Wchnschr. **58**:86 (Jan. 15) 1932.

Congenital cystic degeneration of the lungs usually does not cause complaint by the patient and is discovered accidentally. The patients occasionally show signs of chronic bronchitis. With bronchitis or tuberculosis, the pulmonary condition of the patient remains stationary for many years. If there are clinical signs due to cystic degeneration of the lungs they are: a diminished or shortened percussion note, consonant fine moist râles and perhaps bronchial breathing. The patients do not have fever, do not lose weight and have only slight intermittent bronchitis with or without expectoration. The x-ray picture of the chest might show many small cavities in a circumscribed area, without inflammatory reaction around them. However, inflammation occasionally develops later, secondary to the cystic degeneration of the lungs.

Injections of iodized sesame oil 40 per cent or of iodized poppy seed oil into the bronchi might demonstrate the honeycomb-like design of the multiple cysts. The prognosis as to life is good. However, there is no therapy for this congenital anomaly.

The author described two cases of "honeycomb lung" or congenital cystic degeneration of the lungs. One of the patients died of uremia, and the autopsy verified the clinical diagnosis.

KERESZTURI, New York.

THE PATHOGENESIS OF FUNCTIONAL ALBUMINURIA. H. LEWITUS and W. RABINOWITSCH, Monatschr. f. Kinderh. **52**:250, 1932.

Lewitus and Rabinowitsch review the various theories regarding functional albuminuria. By taking groups of children and causing them to assume certain positions, they first came to the conclusion that the lordotic theory is the most likely. In all children who assumed positions of marked lordosis albuminuria developed. However, further investigations revealed that in many of these children other symptoms developed, such as faintness and poor pulse, and that furthermore the lordosis itself was far more marked than in many of the children brought to the clinic for functional albuminuria. They decide that marked lordoses causing interference with the circulation in the kidney will always cause albuminuria, but in those children who are brought to the clinic for this symptom, probably dynamic factors interfering with the blood supply to the kidney are more responsible than the lordosis.

GERSTLEY, Chicago.

ALEUKEMIC MYELOSIS IN AN INFANT OF ELEVEN MONTHS. T. VARGA, Monatschr. f. Kinderh. **53**:211, 1932.

This is the report of a case. The condition begins with indefinite symptoms, usually general weakness, loss of appetite and pallor. Examination shows a definite anemia, enlargement of the liver and spleen and often hemorrhages into the skin and mucous membranes. The last is not constant and was not found in this case. The leukocytes may be diminished in number, with no pathologic cells visible.

GERSTLEY, Chicago.

ALIMENTARY HEMATURIA IN CHILDREN. KURT OCHSENIUS, Monatschr. f. Kinderh. **53**:217, 1932.

This is a report of three cases of hematuria following drinking of a certain type of beer called "Berliner Weissbier." This beer differs from the ordinary types in that the yeast used is light and floats on the surface of the mixture rather than sinking to the bottom, as in the commoner varieties. The beer is rather raw and cloudy. The symptoms could not have been due to the alcoholic content, which was under 3 per cent.

GERSTLEY, Chicago.

THE RÔLE OF THE BASE OF THE SKULL IN THE ETIOLOGY OF GENITAL ATROPHY AND ADIPOSITY. JOSEPH LOOS, Virchows Arch. f. path. Anat. **284**:49, 1932.

In 1924, Raab observed in roentgenograms of patients with dystrophia adiposogenitalis that the sella turcica showed varying shapes, and he concluded that an osseous malformation of the sella might play a rôle in the etiology of the disease. Loos examined the skulls of normal patients and those with genital atrophy and adiposity post mortem for changes of the sella. He observed several cases in which exostoses, increase in size and changes in the angle of the dorsum sellae were present, to which he attributes a rôle in the etiology of the disease. According to his opinion, the pressure exerted by the bone on the adjacent parts of the hypophysis and on the brain might lead to an atrophy of the cells, and he verified this opinion by histologic examination of the brain tissue. In agreement with these observations, he advises separation of cases of osteogenous origin from those of encephalogenous and pituitary origin.

SCHOENTHAL, New York.

EXPERIMENTAL INVESTIGATION ON PNEUMOCOCCUS INFECTIONS IN CHILDHOOD. M. GRUNDEL and O. SAXL, Ztschr. f. Kinderh. **52**:269 (Jan.) 1932.

The problem of pneumococcus infection in children was studied bacteriologically, immunologically and epidemiologically. The results may be summarized as follows:

In young children with uncomplicated pneumonia, the nasopharynx is the most suitable site from which to isolate the causative organisms. Types I, II and III are rather easy to isolate, but the utmost care must be exercised in obtaining type X. In attempting its isolation, other sources, such as the blood, should be utilized.

Types I and II are associated with lobar pneumonia and empyema, while type X is usually found in localized pneumonic infections. Types I and II are also frequently found in pleuritic complications. Types I, II and III are found in cases of pneumococcus meningitis and pneumococcus peritonitis and in most cases of acute otitis media.

Immune bodies for pneumococci are absent in the blood of young children. They appear after an infection with types I and II, the greatest concentration occurring after an infection with type I. The production of immune bodies for pneumococci is very poor in children under 2 years of age. In contrast to this, immune bodies can be produced in older children by intensive immunization with dead organisms.

Classic lobar pneumonia of the type found in adults does not occur in children under 3 years of age. The crisis in lobar pneumonia may thus be associated with the age at which immune bodies appear.

SHELLING, Baltimore.

CHRONIC HEPATOGENIC HYPOGLYCEMIA IN CHILDREN. S. VAN CREVELD, Ztschr. f. Kinderh. **52**:299 (Feb.) 1932.

The author describes a case of "fasting hypoglycemia" in a 10 year old boy. The hypoglycemia was not accompanied by convulsions or other manifestations of hyperinsulinism. When the child was 1 year old, it was noticed that he had

a large abdomen and a palpable mass on the right side. Intra-abdominal neoplasm was diagnosed, but laparotomy revealed a large, smooth liver. In later childhood, his appearance suggested dystrophia adiposogenitalis. The hypoglycemia was accompanied by marked ketosis. The blood sugar curves differed from the normal in that the initial rise was lower, and in that there was a drop in one and a half hours, with a secondary rise in two hours. Epinephrine did not raise the blood sugar level during fasting. The respiratory quotient before epinephrine was given was normal, and after this drug was given, it did not rise but dropped. The administration of epinephrine also increased the ketosis and sometimes induced vomiting. The concentration of blood glycogen in this patient was higher than normal.

The author thinks that the hypoglycemia was of hepatic origin; i. e., it was due to lack of glycogen storage in the pathologic liver.

SHELLING, Baltimore.

SUBEPIPHYSEAL DECALCIFICATION IN A TEN MONTHS OLD NURSLING. P. GYÖRGY, Ztschr. f. Kinderh. **52**:389 (Feb.) 1932.

The infant had otitis media at 6 months of age without sequelae. Shortly afterward, because of paleness and anemia, the family physician thought that the child lacked vitamins and prescribed 10 drops of irradiated ergosterol and fifteen minutes of exposure to direct sunlight, daily. Three weeks later, generalized edema developed. The urine contained albumin and lipoids. The heart was slightly enlarged to the left, but there was no hypertension. The blood nonprotein nitrogen was 32 mg., the serum calcium 8.6 mg., the inorganic phosphorus 3.3 mg., and the cholesterol 62 mg. per hundred cubic centimeters. An x-ray picture revealed areas of decalcification below the epiphyses of the long bones, similar to those produced in animals by huge doses of viosterol and calcium-poor diets.

The diagnosis was not entirely clear. The normal nonprotein nitrogen content of the blood and the absence of hematuria and of hypertension spoke against nephritis. Nephrosis was likely, but the blood cholesterol was lower than normal instead of being high. The absence of hypercalcemia and hyperphosphatemia (especially, the values lower than normal) and the lack of symptoms of overdosage in infants fed several hundred times the dosage given this child spoke against irradiated ergosterol poisoning. However, the peculiar changes in the bones, observed in no other condition, pointed to a primary irradiated ergosterol effect on the kidneys, and the abnormal blood findings were possibly due to the nephrotic symptoms.

SHELLING, Baltimore.

SUBACUTE BACTERIAL ENDOCARDITIS IN CHILDHOOD. A. E. FISCHER, Ztschr. f. Kinderh. **52**:405 (Feb.) 1932.

Fischer analyzed twenty fatal cases of subacute bacterial endocarditis in children. The ages of the latter ranged between 3 and 12 years. Nineteen of the patients had definite cardiac symptoms, and of these two had congenital heart disease. All had petechiae and Osler's nodes, and eighteen exhibited symptoms of embolism. Eighteen gave positive blood cultures, and fifteen showed hematuria.

SHELLING, Baltimore.

THE THERAPY IN PNEUMONIA IN EARLY INFANCY. C. V. RODKIN and E. M. TURCHINI, Oxmat. i Ozdp. **2**:39, 1931.

For a long time the therapy of pneumonia in infancy did not differ much from that in the adult. The great mortality in infants from pneumonia shows that all methods of therapy are not effective. Most authors agree that fresh air is of great therapeutic value. It improves cardiovascular functions, prevents cyanosis, promotes sleep and diminishes the infection. Vaccine in some cases has reduced the mortality 50 per cent. Of the drugs, epinephrine, caffeine, camphor,

bromides, methenamine and phenobarbital may be used advantageously. In capillary bronchitis a mustard poultice may be applied. The author condemns the use of expectorants (because they produce shortness of breath), quinine, cupping, and narcotics.

KRUPINSKI, Chicago.

REPORT OF A CASE OF OSTEOCHONDROMA MULTIPLEX. W. ROCZYNSKI, Pediat. polska **11**:184 (May-June) 1931.

The author states that this is a rare malady. In this case, in a child 7 years old, he counted thirty-nine bony tumors. An extensive differential diagnosis is given. The author claims that these growths are neither malignant nor benign. They are not benign because of the chronic character, and they are not malignant because histopathologically, they present atypical cells. The cause of this disease is not known, although heredity is a strong factor. The only treatment of any kind is actinotherapy, roentgen rays or the injection of from 200 to 300 mg. of a thorium salt weekly.

KRUPINSKI, Chicago.

ROENTGENOLOGIC DIAGNOSIS OF CHRONIC LEAD POISONING AND OF SO-CALLED LEAD MENINGITIS IN INFANTS. M. KASAHARA, Jikken Iho **18**:146 (Dec. 12) 1931.

The author, stimulated by the findings of Park-Jackson-Kajdi and of Vogt with roentgenograms in cases of lead poisoning in children, studied the problem in fifty cases in the pediatric clinic of Osaka Imperial University from June to October, 1931. He found that almost without exception the ends of the long bones (humerus, radius, ulna, femur, tibia, fibula and anterior ribs) showed peculiar transverse shadows characterized by sharp outlines with definite width of uniform density. These findings agree with those noted by the American investigators and by Sato in Japan. These shadows are not seen in cases of lead poisoning in adults, as may be surmised from one case that the author observed. The oldest patient in the author's series was a child aged 2 years and 8 months. In his series, not only the long bones, but some short bones showed these shadows. The flat bones also appeared to participate in the same process. In a later communication, Kasahara and Hiroshima (*Jikken Iho* **18**:454 [Feb. 12] 1932) published roentgenograms of a 1 year old infant with lead poisoning, which revealed dense shadows around the centers of ossification of the sternum and along the upper margin of the ilium and the vertebral margin of the scapula.

KATO, Chicago.

INTESTINAL WORMS ON THE ISLE OF TERSCHELLING (MIDSLAND). J. H. SCHUURMANS STEKHOVEN, JR., Nederl. tijdschr. v. geneesk. **75**:859 (Feb. 21) 1931.

At Midsland, on the isle of Terschelling (Holland), the author found an extensive infection with Ascaris lumbricoides and Trichocephalus dispar. Ascaris occurred in 36.7 per cent, and Trichocephalus in 53.1 per cent of the investigated one hundred and eighteen cases (that is, in 42.6 per cent of the population). At West-Terschelling Ascaris was found in 82.4 per cent, and Trichocephalus in 93 per cent of the investigated cases (fifty-seven persons). The intensity of the infection was greatest during the first years of life, decreasing after the fifteenth year. The intensity of the infection remained high for a longer time in girls than in boys. The cause of the infection was largely due to the fertilization of the kitchen garden with human feces; 41.6 per cent of the gardens contained eggs of intestinal worms. The greater part of the people examined had eosinophilia; the number of eosinophil cells in the blood was often high, especially in young people. It clearly appeared that Oxyuris may give rise to an important degree of eosinophilia. The significance of other worms in this respect could not be determined.

VAN CREVELD, Amsterdam, Holland.

Nervous Diseases

BASAL METABOLIC RATE IN EPILEPSY; REPORT OF THREE HUNDRED AND FIFTY CASES. LEGRAND A. DAMON, Arch. Neurol. & Psychiat. **28**:120 (July) 1932.

Determination of the basal metabolism of three hundred and fifty epileptic patients indicated that a rather large percentage of such patients have a rate below the average.

BEVERLY, Chicago.

THE PSYCHIATRIC IMPLICATIONS IN ENURESIS. OSCAR B. MARKEY, Arch. Pediat. **49**:269 (May) 1932.

The writer discusses the normal psychiatric and physiologic development of elimination. Some of the causes of enuresis are discussed in detail, particular emphasis being placed on the emotional factor. Suggestions as to treatment along psychiatric lines are given. The writer believes that treatment can best be handled by a pediatrician who appreciates the psychiatric factor, and believes that the part a psychiatrist plays in the treatment of these patients is rarely different from the part that any other physician or worker associated with the child should play. The writer stresses some of the prevalent forms of therapy that should not be used.

WADDELL, University, Va.

STREPTOCOCCIC MENINGITIS. E. APPELBAUM, J. A. M. A. **98**:1253 (April 9) 1932.

Streptococci were isolated from the cerebrospinal fluids of three children who subsequently recovered. Antimeningococcic serum was given. Serotherapy probably played no rôle in the recovery of these infants. Up to the time of this report forty-six patients had recovered. The infection was traceable to otitis media in many instances.

BONAR, Salt Lake City.

THE INTRACAROTID TREATMENT OF MENINGITIS. A. S. CRAWFORD, J. A. M. A. **98**:1531 (April 30) 1932.

Thirty-one patients with meningitis from six clinics were treated by intracarotid injections of Pregl's solution of iodine alone or with specific serums or other chemotherapy. The injections were usually followed either by repeated lumbar or cistern punctures or by continuous subarachnoid drainage. Of twenty-five patients with nonmeningococcic cases, six recovered. Of six patients with meningococcic cases, all failing to respond to the usual treatment, four recovered. The author believes that this treatment has given sufficient encouragement to justify further trial.

BONAR, Salt Lake City.

MOTOR PARALYSIS OF INDIVIDUAL NERVES FOLLOWING ADMINISTRATION OF PROPHYLACTIC SERUMS. A. C. GORDON, J. A. M. A. **98**:1625 (May 7) 1932.

Motor and sensory phenomena are the most frequent complications of the administration of serum. Antitetanic, antipneumococcic, antidiphtheritic, antistreptococcic and antituberculous serums are most frequently encountered. Prophylactic inoculations against scarlet fever caused musculospiral palsy in three cases and facial palsy in one. The duration of paralytic phenomena after prophylactic inoculations is shorter than after therapeutic inoculations. The paralysis of motor nerves is transient and temporary. Paralysis of mixed nerves or of sensory nerves is more prolonged and grave.

BONAR, Salt Lake City.

SUBDURAL HEMATOMA IN INFANTS. M. M. PEET and E. A. KAHN, J. A. M. A. **98**:1851 (May 28) 1932.

Subdural hematoma is usually diagnosed as idiopathic hydrocephalus. The former is amenable to surgical treatment. The onset of hydrocephalus with convulsions is rare before the age of 4 months. In this condition there is a bright alert expression as compared with the dull apathetic face of the child with idiopathic hydrocephalus. Percussion over the parietal region elicits a dull note. In hydrocephalus it is tympanitic (McEwen's sign). On puncture of a fontanel true hydrocephalus yields a colorless ventricular fluid at a depth of from 1 to 2 cm., while in subdural hematoma a straw-colored or bloody fluid appears as the fontanel is pierced. Trauma is the most important etiologic factor. Malnutrition may be a predisposing factor. Following the blow, hemorrhage from the superior cerebral veins occurs, followed by organization along the inner dural surface with the formation of very thin-walled vessels, from which there is continuous transudation with occasional rupture. The operative procedure is described.

BONAR, Salt Lake City.

"ABORTIVE" POLIOMYELITIS. J. R. PAUL, R. SALINGER and J. D. TRASK, J. A. M. A. **98**:2262 (June 25) 1932.

An epidemiologic study was made of poliomyelitis with respect to the fairly characteristic minor illness in association with epidemics of this disease, commonly called "abortive" poliomyelitis. The picture is that of an acute infection of short duration, with symptoms of fever, sore throat, headache and vomiting. In two hundred and twenty-two families in which poliomyelitis appeared, a history of minor illnesses was frequent. In the age group from 1 to 4 years the incidence was 39 per cent, and in the age group from 5 to 9 it was 32 per cent. In sixty control families during the epidemic the incidence was 9 per cent. In three communities the ratio of cases of poliomyelitis to these characteristic minor illnesses was identical, 1:6. Poliomyelitis virus was isolated from the nasopharyngeal washings taken on the first or second day in two of twelve instances. These minor illnesses seem to have a common causal relationship to orthodox poliomyelitis.

BONAR, Salt Lake City.

THE TREATMENT OF OBSTINATE CHOREA WITH NIRVANOL. T. D. JONES and J. L. JACOBS, J. A. M. A. **99**:18 (July 2) 1932.

Three patients with obstinate cases of chorea minor were treated with the hypnotic phenyl-ethyl-hydantoin. No permanent benefit was obtained. The drug produces an irritant reaction in the normal skin, so that any estimation of specific cutaneous hypersensitiveness is difficult to determine. A study of these cases revealed no evidence of a specific idiosyncrasy. "Nirvanol sickness," characterized by fever, rash and eosinophilia, occurred in all three patients, one suffering a dangerous reaction with subcutaneous and gingival hemorrhages, a prolonged bleeding time and reduction in the blood platelets. It would seem that the dosage of the drug used at present produces toxic symptoms which lead to dangerous complications.

BONAR, Salt Lake City.

SOME ALLERGIC FACTORS IN ESSENTIAL EPILEPSY. RALPH H. SPANGLER, J. Allergy **3**:39 (Nov.) 1931.

"The trend today of many investigators into the mechanism of both allergy and epilepsy is to consider their clinical manifestations the response of a neurogenous background resulting from a disturbed metabolic process which it seems it may be possible to transmit by the germ plasm."

The author reviews and discusses the various factors, experimental, hereditary, biochemical, clinical and therapeutic, which tend to show that idiopathic epilepsy may be a manifestation of allergy. From the experimental findings and clinical

observations, he hypothecates that "the patient with a brain lesion who develops recurring convulsions was made potentially epileptic by a previous hereditary or acquired allergic metabolic disturbance."

HOYER, Cincinnati.

PSYCHOLOGICAL ASPECTS OF NUTRITION IN CHILDHOOD. JOSEPH BRENNEMANN, J. Pediat. **1**:145 (Aug.) 1932.

Dr. Brennemann has written this article in his usual interesting style. The ideas that he expresses are supported by many years of experience and observation. He stresses the fact that the child is a thinking, emotional and preferring tyrant rather than a grist mill into which food can be poured. In the first three months of life, if the breast milk is insufficient, it is advisable to offer a bottle after the nursing. Emphasis is placed on the policy of never forcing the child's feedings. Giving a bottle daily to all babies from the start will avoid later weaning difficulties. Cereal feedings are given by spoon at the third month and vegetables by the fifth month. A large variety of foods are started between the seventh and ninth months. Use of the cup in drinking should be begun before the end of the first year.

The injurious influence of nervous, worried caretakers and irritating disturbances in the infant's life is discussed. The widespread frequency of anorexia in older children at home is explained by two normal human traits, negativism and the desire for the spotlight, when he is abnormally stimulated by an external irritant, the parent, who tries to coerce the child into eating as the adult dictates. The prophylaxis of anorexia consists in never forcing or coaxing a child to eat. The cure of anorexia lies in a change of environment.

LEMASTER, Evanston, Ill.

PHENYLETHYLHYDANTOIN TREATMENT OF ACUTE CHOREA IN CHILDREN. ROGER H. DENNETT and SAMUEL WETCHLER, J. Pediat. **1**:203 (Aug.) 1932.

The authors report excellent results in the treatment of seventy-two patients with chorea with phenyl-ethyl-hydantoin, from 10 to 15 grains (0.6 to 0.9 Gm.) daily until rash or fever appeared. No harmful effects were seen. Symptoms of chorea disappeared in all patients within twenty-one days. Phenyl-ethyl-hydantoin is considered to be the treatment of choice for individual attacks of chorea.

LEMASTER, Evanston, Ill.

PHENYLETHYLHYDANTOIN TREATMENT OF CHOREA. GUSTAV F. WEINFELD and RAYMOND COHEN, J. Pediat. **1**:210 (Aug.) 1932.

No favorable results were seen in six patients with chorea treated with phenylethylhydantoin, 0.3 Gm. or more daily, until rash or fever appeared. Of three children who failed to respond to treatment with this drug, two were definitely improved after the administration of typhoid vaccine injected intravenously.

LEMASTER, Evanston, Ill.

EPIDURAL ABSCESS COMPLICATED BY STAPHYLOCOCCIC MENINGITIS. EUGENE ROSAMOND, J. Pediat. **1**:230 (Aug.) 1932.

A case of primary hematogenous epidural abscess localized in the lumbar region is reported. Cerebrospinal staphylococcic meningitis developed after the introduction of a spinal puncture needle through the infected area. Complete recovery followed laminectomy and drainage of the abscess cavity, plus the use of an intradural drain and the administration of large quantities of water.

LEMASTER, Evanston, Ill.

MENINGITIS OF OTITIC ORIGIN. WILLIAM L. RHODES, M. J. & Rec. **136**:5 (July 6) 1932.

A boy, 14 years old, suffered, on December 23, from an attack of otitis media. The condition subsided the following day, and the boy returned to play. Five days later, he complained again of pain in the ear and on December 29 mastoiditis developed on the same side. Operation was performed on the same evening. The mastoid was found to be sclerotic. The antrum and the middle ear were filled with pus, culture of which showed Staphylococcus pyogenes-citreus and Bacillus pyocyaneus. The morning after operation, the patient was conscious and seemed to be in a satisfactory condition. That evening rigidity of the neck developed and spinal puncture showed that the spinal fluid was turgid and under pressure. Examination of the fluid showed a gram-negative diplococcus and a cell count of 4,100. Was this meningitis prior or subsequent to the operation? The author believed that the meningeal invasion was purely of otitic origin, and that it had been in existence several days prior to operation and was not recognized at the time.

WILLIAMSON, New Orleans.

CISTERNAL PUNCTURE. MORRIS A. LYONS, New York State J. Med. **32**:78 (Jan. 15) 1932.

Cisternal punctures cause less headache than lumbar punctures, but fluid containing accidental blood is more common in the former method. Serious injuries following cisternal puncture are rare.

AIKMAN, Rochester, N. Y.

RECENT AGE TRENDS IN POLIOMYELITIS. MILDRED WEEKS WELLS, New York State J. Med. **32**:393 (April 1) 1932.

Since 1918 there has been an increase in the incidence of poliomyelitis in the higher age groups. The relative number of cases in the 0 to 4 year group has markedly decreased, while there is an increase in the groups from 5 to 9 and 10 to 14 years. The percentage of cases in children between 15 and 19 years as well as in adults has remained fairly constant. Tabulations from Massachusetts and from the city of New York are shown.

AIKMAN, Rochester, N. Y.

THE ADMINISTRATION OF SERUM IN MENINGITIS. GEORGE M. LYON, South. M. J. **25**:818 (Aug.) 1932.

The author reports a method of treatment of cerebrospinal meningitis which has been very successful especially in early infancy, showing an exceptionally high percentage of recovery and a marked shortness of the duration of the illness. There were no unpleasant sequelae.

Success in the treatment depends on the early recognition of the disease and on the early and efficient administration of a specific antimeningococcus serum. The serum must be of high potency and must contain antibodies specific for the causative organism. The concentration of serum within the cerebrospinal system must be maintained as high as possible. The serum must be in intimate contact with the meningococci.

A large initial dosage of serum combined with an extensive withdrawal of contaminated cerebrospinal fluid is obtained. The resulting concentration of serum is high, and an intimate contact of serum with meningococci is provided. This seems to lead to early sterilization of the fluid. In the cases reported by the author, two serum substitutions effected a clinical cure. Very few injections of serum were required. In this manner it was possible to avoid many of the complications resulting from the repeated administration of serum intrathecally.

Neither the ventricular puncture nor the administration of serum by this method produced any untoward effects in the patients so treated. No vomiting,

convulsions, cardiac or respiratory embarrassment occurred. There was no increased depression nor aggravation of the clinical condition at any time.

The output of cerebrospinal fluid in response to the serum injected seemed to be greater than that obtained by simpler methods of administration. In the forty-eight hour period following the introduction of serum, as little fluid as possible should be withdrawn, in an attempt to maintain throughout that period a high concentration of serum. Care must be taken not to exert too much pressure within the cerebrospinal chamber.

SCHLUTZ, Chicago.

EPILEPSY IN CHILDREN. M. G. PETERMAN, Wisconsin M. J. **31**:169 (March) 1932.

As opposed to the theory that epilepsy is a symptom and included among a larger group of the convulsive states, the author considers idiopathic epilepsy as a disease entity associated with constitutional inferiority or personality and hereditary defects not demonstrable pathologically. Children in whom it develops are born potential epileptic patients and need some metabolic disturbance to precipitate the convulsions. This disturbance is usually associated with cerebral edema. The "convulsive states" and spasmophilia of the infant are unrelated to epilepsy. The diagnosis is made by exclusion. More progress has been made in treatment than in the study of etiology. Starvation is the most effective means of controlling grand and petit mal seizures. The ketogenic diet and restrictions of fluid intake are effective in controlling the condition. Phenobarbital is a great aid.

The author presents a new series of 110 children between 15½ months and 15 years of age having idiopathic epilepsy. Of these, 43 per cent had a negative family history. Of those put on a daily regimen (34) of a well balanced anticonstipation diet with moderate fluid restriction, adequate regular rest and sleep, saline cathartics as indicated and restricted physical and mental activities, plus phenobarbital, 47 per cent have been free from seizures for from six months to three years. Of 51 selected patients treated with the ketogenic diet, 39 have been free from seizures for from six months to three and one-half years. Petit mal attacks are better controlled on the ketogenic diet. In the first group, 4 patients were unimproved and 6 were lost from observation. In the second group, 9 showed no improvement. Other plans of treatment were tried in smaller groups, with varying results.

JANNEY, Milwaukee.

A CASE OF PORENCEPHALIC IMBECILITY. RICHARD J. A. BERRY and R. M. BATES, Brit. M. J. **1**:830 (May 7) 1932.

The authors report a case of porencephaly in an adult with complications and autopsy observations.

ROYSTER, University, Va.

HEREDITY AND EPILEPSY. J. S. MANSON, Brit. M. J. **1**:887 (May 14) 1932.

The author observed two families in which intermarriage has occurred. Both families have been observed for four generations. Evidence points strongly to epilepsy in these families being strongly heritable.

In the last paragraph of the report the author states: "In this pedigree the age of onset varies from 8 to 40 years, and this should be borne in mind when studying pedigrees of epileptic families. It may be that some die before the age of onset and are classed as normal. This is a fallacy which should be remembered when an attempt is made to draw any conclusions as to the relation of heredity to epilepsy."

ROYSTER, University, Va.

DERMOID CYST OF THE BRAIN. J. WILKIE SCOTT, Proc. Roy. Soc. Med. **25**: 720 (March) 1932.

This case was reported in a boy aged 2½ years. He was brought to the hospital because of backwardness in development and loss of power in the right

arm. His head had been large since birth. A roentgenogram showed the presence of teeth near the sella turcica and also a shadow suggesting the outline of a cyst. The pictures are reproduced in the report.

WILLIAMSON, New Orleans.

EFFECTS OF ROENTGENOTHERAPY IN POLIOMYELITIS. H. BORDIER and A. GOUJON, Paris méd. **1**:564 (June 25) 1932.

The authors report a case of poliomyelitis in which roentgenotherapy was given three months after the probable acute attack. The treatment consisted of a cutaneous dose of 400 roentgens given on three successive days. A 6 mm. aluminum filter was used with a distance of 15 cm. The cervical region was exposed so that the rays struck the third to sixth cervical vertebrae at a 30 degree angle. This treatment was repeated twice after intervals of a month. Improvement began immediately.

SANFORD, Chicago.

PSEUDOTUBERCULOUS MENINGITIS. O. LANGE, Rev. Assoc. paulista de med. **1**:191 (March) 1932.

Lange recalls the controversies with regard to the curability of tuberculous meningitis, and refers to articles in foreign journals on the acute and benign meningitic syndromes that simulate clinically and as to the body fluids tuberculous meningitis. He calls attention to the causes that may produce acute meningitis of this type, and gives the various terms employed in other countries to designate this form of meningitis. He cites his reasons for preferring the term "benign lymphocytic acute meningitis." The author reports experimental studies made by inoculating into various animals cerebrospinal fluid taken from patients affected with this type of meningitis. In closing, he reports two of the eight cases observed thus far in the neurologic department of the Faculty of Medicine of São Paulo.

EDITOR'S ABSTRACT. [ARCH. NEUROL. & PSYCHIAT.]

CEREBRAL ADIPOSITY AFTER POSTVACCINAL ENCEPHALITIS. W. RAAB, Med. Klin. **27**:1760 (Nov. 27) 1931.

This is a case report. In a girl, aged 7 years, postvaccinal encephalitis developed four or five days after the first vaccination. In the acute stage the patient had very high fever and was in a soporous condition for several days. Apparently she completely recovered from this illness. Two years later a general adiposity of the cerebral type developed which reached a high degree and continued to get worse even up to the age of 13 years. Treatment was given with a thyroid preparation. The child improved rapidly under the treatment, and in seven weeks lost 11.3 Kg. The author interprets the process as a cerebral adiposity following encephalitis.

ZENTAY, St. Louis.

INTRALUMBAR USE OF SERUM. H. FASOLD and H. GROSSMANN, Monatschr. f. Kinderh. **54**:48, 1932.

In experiments with rabbits, it was shown that diphtheria antitoxin injected intravenously reached the nervous elements of the central nervous system. In this way, it was possible to produce complete immunity against a subsequent fatal dose of diphtheria toxin injected intracerebrally. The authors believe that these experiments show that it is not necessary to inject various serums into the spinal canal but that intravenous therapy is sufficient.

GERSTLEY, Chicago.

FEEBLE NURSING AS A SIGN OF ABNORMALITY OF THE NERVOUS SYSTEM. M. JOGICHESS, Monatschr. f. Kinderh. **54**:381, 1932.

In practically all of a series of thirty-eight nurslings who showed difficulty with feeding from the very beginning of the observations, the author was able

to establish the diagnosis of severe disease of the nervous system. The conditions were later diagnosed as athetosis, Little's disease, congenital hemiplegia, spastic diplegia, epilepsy and psychopathic conditions. In view of the variety of conditions with which this symptom may be associated, the author suggests that one should be very careful in making a prognosis.

GERSTLEY, Chicago.

TORSION DYSTONIA. OTTILLIE BUDDE, Monatschr. f. Kinderh. **54**:398, 1932.

A case of this rare disease is reported in which the patient, a 6 year old boy, developed disturbances of gait with athetoid and choreiform movements and tonic spasms of the musculature of the neck and back, leading to severe lordosis. The face and the muscles of speech were not involved, and there was no disturbance of the intellect or of sensation.

The prognosis is fairly good for life, but not so for recovery.

GERSTLEY, Chicago.

RELATION OF THE PAVLOV REFLEXES TO THE NEUROPATHY OF CHILDREN. ALOJZ CHURA, Bratisl. lekár. listy **12**:379 (Aug.) 1932.

The author analyzes the influence of inadequate psychic stimulation on the appearance of neuropathy in children. As the result of clinical observation he is of the opinion that the numerous and repeated faults of education, the repetition of psychic irritations during the period following the tender age, are nothing but the practice of unsuitable conditional reflexes or abnormal reactions, actually affecting vegetative function, for example, appetite. He supports this view by experiments. He tested the conditional reflex, the secretion of insulin and the increased glycotonia of the tissues on sound stimulation. He obtained proof that the repetition of the same irritation at a stipulated time can throw the organism into a condition of increased glycotonia. This indicates a relation to the mechanism of origin of neuropathy in childhood, of "organic neurosis," etc. Besides the common faults of education, the child of today experiences numerous psychic irritations which it cannot digest. Owing to their great number, they cannot be realized and grappled with, and leave behind inadequate satisfaction, fickleness, a desire for fresh stimulations and excitability, leading to a secondary psychic inanition. The total influence of the components presented leads to the well known picture of neuropathy in children.

AUTHOR'S SUMMARY.

TREATMENT OF CHOREA IN CHILDREN WITH PHENYL-ETHYL-HYDANTOIN. FRANTISEK BLAŽEK, Časop. lék. česk. **69**:1743 (Dec. 19); 1782 (Dec. 26) 1930.

Phenyl-ethyl-hydantoin is used by many physicians in preference to phenobarbital and a brand of barbital. The literature on the treatment of chorea is reviewed. The advantages and some of the disadvantages of phenyl-ethyl-hydantoin, such as rash, fever, temporary amnesia and palsy, are discussed. The changes in the blood picture are cited by various authors as consisting of eosinophilia, lymphocytosis and, at times, leukopenia. Ninety-one patients were observed; seventy-one of them were treated with bromides, injections of magnesium sulphate, phenobarbital, epinephrine and other combinations, and twenty were treated with phenyl-ethyl-hydantoin. The dosage was from 0.01 to 0.03 Gm. per kilogram of body weight, given three times a day. In 60 per cent of the cases, a reaction was observed within twelve days, in 20 per cent, after twenty-one days, and in 20 per cent, after twenty-eight days of treatment. The blood picture was checked every three days. In some cases the sedation appeared with the rash and slight fever, and this may be a criterion of the physiologic activity. Some patients were restless at first and after continuation of the treatment became quiet. Two cases are cited in detail. Compared with other methods

the regimen of phenyl-ethyl-hydantoin shortens the period of chorea by half. Although this drug does not prevent exacerbations in all cases, it is the most dependable of the sedatives used in chorea. In patients on phenyl-ethyl-hydantoin, repeated examinations of the blood must be made to guard against possible changes in the elements of the blood and secondary changes in the bones.

STULIK, Chicago.

CLINICAL FEATURES AND INHERITANCE OF A FORM OF OLIGOPHRENIA MET WITH AMONG THE PEASANTRY OF NORTHERN SWEDEN. TORSTEN SJÖGREN, Acta psychiat. et neurol., supp. 2, 1932.

This study was undertaken because of the lack of adequate information concerning the inheritance of mental deficiency. The form of oligophrenia here described cannot be grouped under any recognized concept. It is characterized by a low grade mentality (mental age between 3 and 6 years), a good-natured, pliable character, dysarthritic speech and a stiff, pithecoid attitude. The intelligence permits the patient to carry out very simple routine tasks, but does not allow any normal schooling. No epilepsy or other neurologic findings of note were discovered.

Fifty-two cases of this type were found. The fact that all these cases showed a great uniformity enhances the value of the study. The type of the population also lent itself readily to an investigation of the factors of inheritance. The district in which these cases were discovered is a small parish far removed from large centers of population; hence it has been relatively stable for many generations. The investigation itself was evidently carried out with skill and circumspection.

The affected persons belonged to thirty-four families; most of these could be traced to three original ancestral lines. The author believes that the inheritance follows a recessive trend and is caused by a rare gene present in the original lines. It is in part probably sex-determined, as is shown by the preponderance of males. The anlage either is transmitted more easily through the female or becomes manifest more readily through this path.

REICHLE, Cleveland.

Diseases of the Eye

CONTRIBUTION TO THE ANATOMY OF CONGENITAL ECTROPIUM UVEAE (FLOCCULI IRIDIS). A. FUCHS, Am. J. Ophth. **14**:865 (Sept.) 1931.

The author gives the clinical aspects of ectropium uveae, and remarks on the paucity of histologic studies. He reports two cases and compares the histologic observations with those in an albinotic eye. He concludes that ectropium uveae congenitum consists of an abundant growth of large pigment epithelial cells, which give rise to the formation of folds and figures of spiral form on account of their abundant growth, with a thinning of the epithelium near the zone of reflection, where the epithelium turns from the posterior surface of the iris to the free margin of the iris.

REESE, Philadelphia. [ARCH. OPHTH.]

GROUPED PIGMENTATION OF THE RETINA. WILLIAM A. MANN, JR., Arch. Ophth. **8**:66 (July) 1932.

This rare but definite condition has been reported by many authors since Mauthner first described it in 1868. It is assumed to be congenital although the youngest patient observed was 8 months old. While most of the patients have no other congenital anomalies, a few have. The condition is not progressive and does not interefere with central or peripheral vision, and no evidences of inflammatory or degenerative changes have been noted in any of the reported cases. Consanguinity, hereditary syphilis and sex play no part in the etiology.

WESCOTT, Chicago.

CONGENITAL BILATERAL PALSY OF THE ABDUCENS. WILLIAM H. PHILLIPS, JOSEPHINE K. DIRION and GRANT O. GRAVES, Arch. Ophth. **8**:355 (Sept.) 1932.

A girl, 5 years old, had a strabismus due to bilateral palsy of the abducens nerve. There was also a deficiency of the interni. The child died during operation. Postmortem examination revealed a thymus weighing 36 grains (2.3 Gm.) and lying below the auriculoventricular line. When the brain was removed, no trace of either sixth nerve could be found. Microscopic sections revealed decided abnormalities of the sixth nuclei; they were smaller than normal, not well defined and not in their normal position.

WESCOTT, Chicago.

GLIOMA OF THE OPTIC NERVE. G. GLUCK, Brit. J. Ophth. **16**:406 (July) 1932.

A girl had the left eye removed seven years before the present observations. There had been a history of injury followed by increasing proptosis. The eye was blind and the optic disk pale. A mass was present at the apex of the orbit. Radium was inserted into the orbit. This was followed by an increase in the proptosis, ulceration and perforation of the cornea. The eye was enucleated. Later radium was again applied. When seen by the author the lids were completely adherent to each other. The orbital contents were tense and fluctuating. The cyst was aspirated and iodized poppy seed oil 40 per cent was injected. A roentgenogram showed the iodized oil above the roof of the orbit and also behind the apex, in addition to masses in the orbital cavity. Death occurred about three weeks later. The roof of the orbit was absent, the atrophy of the bone extending up to the superciliary ridge. A cystic growth in the lower part of the left frontal lobe extended down to fill the orbit, pushing the dura before it. The left lateral ventricle was greatly enlarged, the right one less so. The tumor extended up to involve the greater part of the lenticular nucleus. The tumor of the brain showed the characteristic structure of a glioma. The stump of the optic nerve was recognized in the extradural tissue found at the apex of the orbit; astrocyte cells were present within the dural sheath, but on the whole the tissue had more the character of neural granulation tissue than of true neoplasm.

The case is considered to have additional interest because of its being the first recorded, so far as the author could trace, in which radium therapy was used as the primary and only treatment—i. e., without previous removal of the tumor, or as much of it as was accessible for removal—and because of the diagnostic problem presented by the case before the previous history could be traced.

The author discusses the various aspects of primary tumors of the optic nerve. The article is illustrated.

ZENTMAYER, Philadelphia. [ARCH. OPHTH.]

TWINS WITH EYE DEFECTS: AMETROPIA AND STRABISMUS. J. A. WILSON, Brit. J. Ophth. **16**:421 (July) 1932.

The cases were seen in the course of ordinary school and other work, and, as they were ophthalmologically selected, may not meet the strict requirements of the specialists in biometrics; yet their manifestations may be of some value.

There were twelve pairs of twins. All the pairs were of like sex, and in several pairs the results of retinoscopy were alike. It is therefore reasonable to assume that one half were monozygotic twins, as it is claimed that dizygotic twins have the similarities and dissimilarities found in other members of the same families born at different times.

In the twelve pairs of twins the cases that were alike amounted to 25 per cent; the cases that were approximately alike, to 33.5 per cent, and the cases showing a difference of more than 1 diopter, to 41.5 per cent. Five of the six children in the first group squinted; four of the eight in the second group, and one of the ten in the third group.

Fifty pairs of brothers and sisters born at different times and not related to twins were studied. The cases that were alike or showed a difference of 0.5 diopter amounted to 14 per cent; the cases approximately alike, to 16 per cent, and the cases showing a difference of more than 1 diopter, to 70 per cent. In the first group, six squinted; in the second, four, and in the third, thirty-one.

ZENTMAYER, Philadelphia. [ARCH. OPHTH.]

A CASE OF RETINITIS PIGMENTOSA WITH POLYDACTYLISM. BAILLIART and SCHIFF-WERTHEIMER, Ann. d'ocul. **169**:314 (April) 1932.

A girl, aged 14, who had six digits on each hand, had presented no sign of retinitis pigmentosa until she was 12 years of age, after a severe case of typhoid, when typical retinitis pigmentosa was discovered. The patient suffered from hereditary syphilis, but was the only one in her family who had polydactylism and a disease of the eyes.

BERENS, New York. [ARCH. NEUROL. & PSYCHIAT.]

TRAUMATIC ENOPHTHALMOS AND FRACTURE OF THE ORBIT. M. DE TREIGNY, GIRARD and BOULAN, Ann. d'ocul. **169**:316 (April) 1932.

De Treigny, Girard and Boulan report the case of a child, aged 2½ years, who, eight months previous to examination, had been in a severe automobile accident. The skull had been injured in the occipital region. The eyeball showed marked enophthalmos, but motility was normal. The iris reacted poorly to direct light. The orbit and the cranial cavities were apparently in communication because the eye pulsated synchronously with the pulse.

BERENS, New York. [ARCH. NEUROL. & PSYCHIAT.]

CONGENITAL FISTULA OF THE LACRIMAL SAC. G. TIRELLI, Rassegna ital. d'ottal. **1**:66 (Jan.-Feb.) 1932.

Only thirty-six cases of this condition were found in the literature, four with a report of histologic examination. A girl, aged 20 years, showed two small openings in the skin below the internal canthi, from one of which pus was expressed on blowing the nose. Both nasolacrimal ducts were patent, and the tear points were normal. The largest of the two tracts was excised, and healing was uneventful. Sections showed a fistula lined with stratified squamous epithelium with some infiltration of mast cells and plasma cells beneath this. The author believes that such congenital fistulas may be explained as outgrowths of the fetal nasolacrimal duct. A bibliography is appended.

GIFFORD, Chicago. [ARCH. OPHTH.]

ANGIOID STREAKS IN THE FUNDUS, A HEREDITARY HISTORY AND PSEUDOXANTHOMA ELASTICUM. H. HARTUNG, Klin. Monatsbl. f. Augenh. **88**:43 (Jan.) 1932.

Two brothers, aged 45 and 28, showed the same typical pigmented angioid streaks of both fundi and pseudoxanthoma elasticum of the skin, first described by Darier in 1896. Eleven similar cases have been reported by several authors. No other member of the family of the two brothers presented a similar condition, but congenital cataract and abnormal coloration of the fundus were discovered in some members. Consanguinity existed; the parents of the two men were great-grandchildren of the same couple. A table is appended, containing references to a number of cases of consanguinity among patients with angioid streaks and pseudoxanthoma. The familial character of the disease has been pointed out by a number of dermatologists, suggesting a hereditary component. The skin disease is usually noticed in childhood, while the youngest patient with angioid streaks reported was 16 years of age. The streaks appear, as a rule, between 30 and 40 years of age. Degenerative processes, demonstrated in the skin disease, also

seem to be the etiologic factor of the ocular symptoms. Inflammatory processes are entirely absent in the fundus of the eye. Irrelevant lesions may be sufficient to rupture the degenerated elastic glassy lamina of the vitreous and to cause the changes in the fundus. The degenerative foci in the macula may develop at various ages. In agreement with Marchesani and Wirz, the author considers a degenerative process in certain portions of the elastic system as the cause of the changes in the fundus. The degenerative character is furthermore demonstrated by the consanguinity and by the symmetry of the changes in the eyes and in the skin. Peculiar yellow discoloration of the fundus and druses of the glassy lamella point to degeneration of the elastic lamella. Swelling and loss of elasticity are followed by shrinking and ruptures, together with secondary pigmentation, so that finally the angioid streaks appear.

STOLL, Cincinnati. [ARCH. OPHTH.]

BANDLIKE FORMATIONS IN THE VITREOUS: REPORT OF TWO CASES. G. KLOESS, Klin. Monatsbl. f. Augenh. **88**:161 (Feb.) 1932.

The first chapter of this paper is devoted to the etiology of bands in the vitreous. Giving due consideration to the three main theories of the origin of the vitreous, the author expresses his opinion that the bands in the vitreous are remnants of the embryonic vascular system, which would support the mesodermal theory. Kloess also considers the differential diagnosis and the types of malformation, inhibition of normal development or sequelae of pathologic processes that may intervene.

He reports two of his own cases. The first patient, a boy, aged 11 years, sustained an injury of the right eye sufficient to cause a tear of a congenital circumpupillary and epipupillary membrane, several strands of which extended into the vitreous. A hemorrhage, resulting from the injury, was supposed to have been caused by the rupture of blood vessels contained in the strands. Two months later the opacities of the vitreous had absorbed.

In the second case, that of a woman, aged 30, the left eye showed an epipupillary membrane and strands in the vitreous. These were remnants of Cloquet's canal and of the hyaloid vessels. An inflammatory origin was excluded.

STOLL, Cincinnati. [ARCH. OPHTH.]

PLASTIC ANATOMY OF INFANTS' AND CHILDREN'S EYES. R. H. KAHN, Med. Klin. **28**:365 (March 11) 1932.

The report of W. Reitsch concerning the artist's unusual conception of the eyes of children and infants stimulated the author to take photographs of many children's eyes from the time of birth at intervals to the age of 15 years. Reitsch felt that no infants' eyes were depicted in the most famous canvases. The author takes exception to the statement, as he believes that the children in Andrea della Robbia's "Foundling Home" are from 2 to 3 years of age. He also cites the fact that in Baroccio's "Prince of Urbino," the eyes are those of a 5 or 6 year old child. In "The Holy Family" of Roger van der Weyden, in which the Christ child is depicted as an infant, the eyes are those of a much older child. On the contrary, the infant in the picture, "The Birth of Christ," by Micheal Packer, shows deep in the fissure the upturned infant's eyes. A series of photographs accompanies the article showing the eyes of a single person taken at the following ages: 48 hours, 11 weeks, 21 months, and 2, 3, 8 and 15 years. The changes in the lids, globe and fissures are explained in detail for each age.

MAYER, Chicago. [ARCH. OPHTH.]

DAMAGE OF THE EYE BY A CRYSTAL OF POTASSIUM PERMANGANATE. C. W. WISSELINK, Nederl. tijdschr. v. geneesk. **75**:4795 (Sept. 19) 1931.

A child, aged 3 years, got a crystal of potassium permanganate into the left eye. Within one hour the eye was washed out repeatedly by the ophthalmologist.

It was found that cornea and conjunctiva were of a decidedly bluish red and that the surface was strongly wrinkled. The corneoscleral border was invisible, and the tension of the eye was very low. The treatment consisted of wet compresses of boiled water and, during the night, Priessnitz compresses of boric acid, 3 per cent. The course was extremely favorable. The next day the eye (cornea, conjunctiva and tension) was nearly normal again.

VAN CREVELD, Amsterdam, Holland.

Diseases of the Ear, Nose and Throat

ACCESSORY NASAL SINUS DISEASE AND ASSOCIATED LUNG LESIONS IN CHILDREN. WILLIAM F. MANGES, Arch. Pediat. **49**:141 (March) 1932.

Attention is again called to the fact that diseases of the accessory nasal sinuses may be the cause of certain conditions in the lungs, such as repeated attacks of bronchitis, pneumonia, large peribronchial glands and asthma. Thirteen incomplete case reports are presented in which, the writer believes, the pathologic changes in the lung followed in the wake of sinus infection.

The article also contains discussions by Drs. Iglauer, Solis-Cohen, Brennemann, Wall, Silverman and Manges.

WADDELL, JR., University, Va.

THE TONSILLECTOMY PROBLEM. J. COLEMAN SCAL, M. J. & Rec. **135**:123 (Feb. 3) 1932.

According to Scal, it is the duty of the laryngologist to operate on any patient who, he conscientiously believes, would be benefited by the removal of the tonsils. The dangers of surgical tonsillectomy at present are negligible, except that which exist from any operative procedure. Careful anesthesia should be the rule, and postoperative hemorrhage should be avoided by not permitting the patient to leave the operating room until the fossae are entirely clean and dry. Surgery should be relied on unless tonsils and other lymphoid tissue in the nose and pharynx can be eliminated by a less unpleasant process. Electrocoagulation is useful when tonsillar tabs and lingual tonsils are left *in situ*. Radium in the form of radon seeds is useful in inoperable cases. Desiccation, fulguration and roentgen treatments for the elimination of the tonsils are not recommended and will soon be relegated to the past.

WILLIAMSON, New Orleans.

FACTORS DELAYING RECOVERY FROM ACUTE OTITIS MEDIA IN CHILDREN. MATHEW S. ERSNER and SYDNEY SHAPIN, M. J. & Rec. **135**:281 (March 16) 1932.

Premature incision of the ear drum should be avoided, as it is best to wait for localization and walling off of the infection. Paracentesis is best performed under general anesthesia. The incision should be wide and must include the area involved. A spontaneous perforation does not necessarily mean that an incision is not indicated. In acute suppurative otitis media, proper and free drainage must be insured. In cases of persistent aural discharge, treatment should be directed to the underlying pathologic nasal conditions, when all other measures have failed. Measures should be employed to increase the resistance. Proper food, tonics, hygienic environment, the administration of insulin and that of calcium are of great value, when properly employed.

WILLIAMSON, New Orleans.

POSTOPERATIVE CARE OF FOREIGN BODY IN THE LUNG IN INFANTS AND YOUNG CHILDREN. M. F. ARBUCKLE, South. M. J. **25**:456 (May) 1932.

Young children are more liable than older children to have complications, such as shock, cyanosis, dyspnea and sepsis. In robust infants with no complicating condition, ordinary examination and routine bronchoscopy are indicated. In the

case of an infant who enters the hospital in a state of shock, with cyanosis and dyspnea, immediate supportive treatment is imperative. A tracheotomy set should be available, and the surgeon should be in constant attendance pending the completion of arrangements for bronchoscopy. A routine bronchoscopy may then be done with safety.

The patient must be placed in an oxygen tent and watched for subsequent developments. If signs of sepsis develop, drainage should be provided by a tracheotomy and the frequent application of suction. The author considers this the surest method of avoiding serious complication in the lungs.

The infant who has had a foreign body in the lung for a considerable period and who is septic as the result of infection in the lung will show great exacerbation of all symptoms after the operation. Tracheotomy with lower bronchoscopy is the operation of choice in such cases.

These patients should always be in an oxygen tent and should receive a great deal of fluid and have excellent postoperative care. The author prefers expectorant mixtures to the use of morphine or atropine in cases showing extensive secretion from the bronchi.

SCHLUTZ, Chicago.

PROPHYLAXIS OF INFECTIONS OF NASOPHARYNGEAL ORIGIN. J. A. WENNBERG, But. Soc. catalana de pediat. **1**:76 (April) 1928.

Many different antiseptics were tried in the prevention of infections of nasopharyngeal origin. Those with a mercurial base were the only ones that succeeded in markedly diminishing the organisms present in concentrations weak enough not to do damage to the tissues. Washing with sterile water proved effective in most cases.

WATSON, Elmhurst, Ill.

THE EAR IN TOWER HEAD. K. WITTMAACK, Monatschr. f. Ohrenh. **66**:44 (Jan.) 1932.

Wittmaack replies to Brunner's report on the anatomic examination in tower head in which the latter stated that the findings in the mastoid process could not be explained in terms of Wittmaack's pneumatization theory. To Brunner's statement that on the basis of the fibrous structure of the mucous membrane he expected, according to Wittmaack's theory, to find a diploid structure of the mastoid process, but found instead an almost sclerotic mastoid, Wittmaack replies that Brunner has misinterpreted the statement in his textbook. In this, he emphasizes that in a mastoid process of the structure described, which he thinks is due to an early cessation of the pneumatization process resulting from a fibrous change of the superficial mucous membrane, one cannot expect such a pronounced diploid structure as in those cases in which the cessation of pneumatization due to fibrous change in the structure of the mucous membrane falls into a later period of development. In this book, he also says that this sclerotic structure is found only in a very small antrum, whereas Brunner considers the antrum in his case to be very large. However, Wittmaack thinks that the plates accompanying Brunner's report show that the antrum was in reality a small one. To the latter's statement that, in addition to fibrous and fibrous-hyperplastic mucous membrane, he found a region of normal mucous membrane, Wittmaack replies that this so-called normal mucous membrane resembled a fibrous mucous membrane more than a normal one. In cases in which it is difficult to judge the structure of the mucous membrane at one point, the morphologic development at this point should be considered as tending in the direction of that which is clearly manifest in the adjacent portions of the membrane, rather than in the opposite direction. Wittmaack thinks that the condition of pneumatization cannot be explained entirely on the basis of constitutional disposition, but is to be explained rather on the assumption that a certain phenotypic influence on the mucous membrane, of changing intensity and sometimes opposing form, took place during certain phases of development.

EDITOR'S ABSTRACT. [ARCH. OTOLARYNG.]

AN ENDEMIC OF TONSILLITIS IN THE ALPS: CONTRIBUTION TO ETIOLOGY OF INFECTIOUS DISEASES. M. WASSERMANN, Monatschr. f. Ohrenh. **66**:144 (Feb.) 1932.

Wassermann reports an endemic of tonsillitis in an Alpine hotel in December in which twenty-six of a total of eighty or ninety guests were stricken. All but one of the cases were in women and children. There were no cases among the hotel staff. While the infection may have been spread by the room servants, the selectivity of the endemic infection can be explained only on the basis of individual predisposition. This predisposition is determined in part by hereditary factors, such as anlage of the connective tissue and constitutional resistance of the blood and in part by the acquired state of health and nutrition which is in turn affected by local and temporal influences. Exposure to the increased heat and light radiation of the sun in Alpine climates, and especially to the chemically active short wave length rays, results in increased metabolism. This is marked at first by increased decomposition of body proteins and may result in an inflammatory disposition of the tissues which, coupled with the increased protein decomposition resulting from sudden strenuous and unaccustomed activity in sports and possible lowering of resistance from overexposure to cold and moisture, predisposes the individual to infection. This accounts for the selection of women and children who, either because they were there for convalescence, or because they were less used to sports than men, easily overtaxed themselves. For prophylaxis, the author advises that young or physically weakened persons do not make the sudden transition from low elevation to Alpine heights, but accustom themselves to the sun's rays by a stop at an elevation of about 1,000 meters. Initial exposure to the sun's rays should be brief, and all physical exertion should be avoided during the first days of acclimatization. The author thinks this report illustrates the importance of individual predisposition in the incidence of disease and of the effect of external and internal influences on this predisposition.

EDITOR'S ABSTRACT. [ARCH. OTOLARYNG.]

RELATIONS BETWEEN ROENTGENOLOGIC AND CLINICAL SYMPTOMS IN ACUTE OTITIS. K. EISINGER, Monatschr. f. Ohrenh. **66**:266 (March) 1932.

Eisinger discusses the relation between roentgenologic and clinical symptoms in acute otitis. Since mastoiditis usually occurs in a relatively well pneumatized mastoid process, whereas chronic otitis usually develops in cases of poor pneumatization, the roentgenologic visualization of the pneumatization type is of prognostic value in the interpretation of symptoms such as profuse secretions, pain, rise in temperature, etc., when these occur late in the course of the disease and the otitis has not shown any definite tendency to heal spontaneously. Absolute indications for operation, such as existing or impending intracranial complications, labyrinthine symptoms, paralysis of the facial nerve or periosteal abscess of the mastoid process, which demand intervention regardless of the stage of the otitis, supersede the indication of the roentgenogram. The disease of the sinus wall within the mastoid process is practically symptomless and can only be inferred from the clinical course, the condition of the middle ear and tympanum and the type and amount of secretion, but roentgenization sometimes makes it possible to find the explanation of these manifestations. However, the roentgenogram can never constitute an absolute indication for operation or be an indication in itself. In the early stage of otitis certain clinical symptoms have little influence on the prognosis and indication because they belong to the normal picture, whereas a roentgenologically visible infection of the bone in the early stage of otitis is of great prognostic significance. In the late stage every clinical symptom, though unimportant in itself, is of great significance, whereas a slight involvement of the bone occurring in this stage is not so significant. A positive roentgenologic observation opposed to an amelioration of clinical symptoms in case of protracted duration of the disease may be regarded as a lagging behind of the roentgenologic

change (if the diagnosis of a mucous otitis can be eliminated by clinical and bacteriologic examination); in mucous otitis, on the other hand, it is a valuable aid to therapy. EDITOR'S ABSTRACT. [ARCH. OTOLARYNG.]

BLOOD PICTURE FOLLOWING SURGICAL INTERVENTIONS, ESPECIALLY FOLLOWING TONSILLECTOMIES. J. BOLAND, Ztschr. f. Hals-, Nasen- u. Ohrenh. **30**:339 (Feb. 29) 1932.

Boland discusses briefly some of the literature on the effect of surgical intervention on the blood picture, and reports his own study of the blood picture following tonsillectomy in a hundred cases. The author's investigations were based on Schilling's hemogram table. Schilling differentiates between a degenerative and a regenerative nuclear shift. The regenerative shift is the one that Arneth calls the shift to the left. In agreement with the investigations in surgery and gynecology, the author always found a postoperative leukocytosis which disappeared in three or four days. The shift to the left was always of slight degree. In the onset of complication the change in the blood picture always preceded the change in the clinical picture by one or two days. The severity of the complication was parallel to the regenerative nuclear shift. The author also mentions that a lymphatic reaction of the blood was found before operation in most of the cases of chronic tonsillitis. He emphasizes the importance of serial examinations and the fact that a change in the blood picture is to be evaluated only as one of many symptoms constituting the entire clinical picture.

EDITOR'S ABSTRACT. [ARCH. OTOLARYNG.]

RHINOLOGIC EXAMINATIONS OF THE SCHOOL CHILDREN OF BERN, WITH SPECIAL CONSIDERATION OF OZENA. H. RAAFLAUB, Ztschr. f. Hals-, Nasen- u. Ohrenh. **30**:359 (Feb. 29) 1932.

Raaflaub reports the results of rhinologic examinations conducted on 9,375 school children of Bern. The chief interest of the investigation centered in the occurrence of ozena. A diagnosis of ozena was made in all children with chronic inflammation and secretion of the nasal mucous membrane and pronounced atrophy of the inferior or middle turbinate, though there was no fetor. Fetor is not a constant symptom of atrophic rhinitis; it is often missing, especially in children. Ozena occurs in 0.35 per cent of the school children of Bern. Up to the age of puberty it occurs with equal frequency in boys and girls; with the age of puberty it occurs about twice as often in girls. In 30 per cent of those affected, the secretion had a fetid odor. Ozena seems to occur more frequently in the poorer districts; also there are more children affected among backward pupils than among those of normal ability. The Wassermann reaction was negative in the twenty-one cases in which a test was made. Enlarged pharyngeal tonsils were found in 37.4 per cent of the normal children and 48 per cent of the backward children. In the fifth year of school the pharyngeal tonsils were enlarged in 47.3 per cent of all the children examined; in the ninth year, in 27.5 per cent. The palatine tonsils were enlarged in 41 per cent of the children in the fifth school year, and in only 31 per cent in the ninth school year. EDITOR'S ABSTRACT. [ARCH. OPHTH.]

TECHNIC OF TONSILLECTOMY IN CHILDREN. HALLE, Ztschr. f. Hals-, Nasen- u. Ohrenh. **30**:380 (Feb. 29) 1932.

Halle states that he agrees with the general principles set forth by Ohnacker in his article on the technic of tonsillectomy in children. He thinks that tonsillotomy may be employed only in cases in which there is a simple hypertrophy of the tonsil which constitutes a mechanical disturbance, and in that case one must be careful not to remove too much of the tonsil so that a merged tonsil, with its dangers of oral sepsis, results. He shares Ohnacker's views on indications for tonsillectomy, adding those cases in which there is fetid odor of the mouth which

cannot be attributed to diseased teeth or gastric disturbances and especially those cases in which there is considerable swelling of the submandibular glands. In respect to the technic of operation, he finds the method outlined by Ohnacker a little more complicated than necessary and describes his own method, by which tonsillectomy can be performed in a few seconds. It is based on Sluder's method, but makes use of the tonsillotome of Fahnenstock or Mathieu instead of the thick instrument of Sluder. To protect the second phalanx of the middle finger from the cutting action of the ring of the tonsillotome owing to the exertion of great pressure, he has devised a flexible ring that fits all fingers and that has a metal tongue over which the ring of the instrument is pushed. The steps of the operation are described; also how these must be modified in cases of adhesions of the tonsil. Halle advises keeping several long artery forceps on hand, but observes that they need rarely be used. Like Ohnacker, he performs adenotomy immediately after tonsillectomy whenever necessary. In most cases tonsillectomy can be performed without anesthesia; only when children are afraid does he employ a superficial ether anesthesia. He warns against an anesthesia deep enough to subdue reflexes, and says that if operation is undertaken with the head inclined slightly forward, swallowing of the adenoids or tonsil or aspiration of blood or tumor particles will not occur. The author does not recommend the operation of Sluder for children over 12 years of age, as adhesions are more frequent then, and there is much greater danger of hemorrhage.

EDITOR'S ABSTRACT. [ARCH. OTOLARYNG.]

RHINOGENOUS CEREBRAL ABSCESS OF FRONTAL LOBE COMPLICATED BY GENERALIZED PYEMIA. JUNG, Ztschr. f. Laryng., Rhin. (Teil 1: Folia oto-laryng.) **22**:145 (Feb.) 1932.

Jung reports a case of rhinogenous abscess of the frontal lobe complicated by generalized pyemia in a boy, aged 12, which was followed by recovery. As there was no clinical basis for assuming a thrombosis of the large sinus, the author thinks that the pyemia resulted from invasion of the many veins near the site of operation by infectious agents. EDITOR'S ABSTRACT. [ARCH. OTOLARYNG.]

CEREBRAL SYMPTOMS IN UNCOMPLICATED OTOGENOUS EXTRADURAL ABSCESS AND IN SINUS THROMBOSIS. W. UFFENORDE, Ztschr. f. Laryng., Rhin. (Teil 1: Folia oto-laryng.) **22**:151 (Feb.) 1932.

Uffenorde reports two cases of uncomplicated otogenous extradural abscess and three cases of uncomplicated sinus thrombosis with cerebral symptoms. In calling them uncomplicated, he means that the changes that caused the cerebral symptoms were only incidental to the main disease and tended to recede spontaneously after intervention in the latter; from an anatomicopathologic standpoint, they were not uncomplicated. The symptoms were foot-clonus, Babinski's reflex and marked bilateral hypotonia, all of them distinct and persistent. The first case was that of a boy, aged 10 years, with chronic suppuration of a cholesteatoma on the left side, who had an extradural abscess in the posterior cranial fossa. The pronounced Babinski's reflex on the right side was still present four weeks after recovery from the operation. The second case was that of a man with acute retrotympanal otitis media and an extradural abscess in the posterior cranial fossa on the right side. There was a pronounced foot-clonus on the right side and a temporary Babinski's reflex. The clonus was still distinct four weeks after dismissal of the patient. The third case was one of otitis media with cholesteatoma, large perisinuous abscess and extensive sinus thrombosis. After elimination of the thrombosed sinus, a pronounced foot-clonus appeared contralaterally, lasting about one month. The fourth case was one of sinus thrombosis following acute mucous otitis. There was a Babinski's reflex on the contralateral side, which was still present more than a year after the operation. The last case was one of sinus thrombosis fol-

lowing cholesteatomatous suppuration with unusual extension of the sinus changes to the other side, metastases and a large lung abscess. This case exhibited marked bilateral hypotonia of the lower extremities. The case is of special interest because the symptoms of hypotonia, nystagmus to the diseased side and retarded and scanning speech without labyrinth disturbance superseded the septic symptoms and pointed to a cerebellar abscess. Opposed to this view was the fact that the disturbance was on both sides, and this strengthened the author in diagnosing the cerebellar aspect of the complex clinical picture as a collateral infectious-toxic and local manifestation of stasis in the lymph and blood circulation in the cerebellum due to disintegration of the thrombus and venous influxes. The author thinks the most important conclusion to be drawn from these cases is that the symptoms of Babinski's reflex, foot-clonus and pronounced hypotonia may accompany extradural abscess and sinus thrombosis without the existence of a serious cerebral process that demands specific therapeutic measures.

EDITOR'S ABSTRACT. [ARCH. OTOLARYNG.]

TONSILLECTOMY IN CHILDREN. F. REUTER, Ztschr. f. Laryng., Rhin. (Teil 1: Folia oto-laryng.) **22**:186 (Feb.) 1932.

Reuter presents his reasons for preferring tonsillectomy to tonsillotomy in children and discusses tonsillectomy in children from the standpoint of indication for operation, technic and results. The author observed that most adults who came to him for tonsillectomy had undergone tonsillotomy when they were children. The complaints for which tonsillotomy was undertaken often recurred more severely after the operation. Disease of the cervical glands in adults was often cured by tonsillectomy, and the author assumed a similar reaction in children. In children in whom the tonsillotomy was practically a tonsillectomy, results were especially favorable. These and other reasons led him to the exclusive use of tonsillectomy in children. The indications for tonsillectomy are: (1) hypertrophy of the tonsils, if they are constantly pathologic; (2) chronic tonsillitis with or without hypertrophy, and (3) all cases of recurring tonsillogenous disease. The author performed tonsillectomy in 547 children, without any injuries resulting from operation. The susceptibility to colds and other disease was decreased. Great improvement in appetite, growth and nutrition was observed. A good effect on diseases of the cervical glands was observed. Disturbances of speech were not observed. He describes his method of operation. Local anesthesia is always employed. He does not use a gag, as this causes the children to scream and press, resulting in increased hemorrhage. The importance of understanding child psychology is stressed. He has had no hemorrhages and thinks these are more likely to occur in tonsillotomy than in tonsillectomy. Tonsillectomy in children is not followed by functional deficiency, because only a part of the lymphatic ring of the pharynx is removed in extirpating the palatine tonsil. In children the regenerative capacity of the tissue is strong enough to form new tissue if too much has been removed, thus protecting the child from injury.

EDITOR'S ABSTRACT. [ARCH. OTOLARYNG.]

Diseases of the Skin

ACRODYNIA: ITS ETIOLOGY. HAROLD T. NESBIT, Arch. Pediat. **49**:135 (March) 1932.

The possible causes of acrodynia are discussed and a case of acrodynia occurring in a 17 months old infant is presented. Prompt improvement followed treatment with brewer's yeast and cereal, these materials being augmented by the use of ultraviolet rays. The writer feels that his case supports the theory that acrodynia is a vitamin B deficiency disease.

WADDELL, JR., University, Va.

HEREDITARY ECTODERMAL DYSPLASIA OF THE ANHIDROTIC TYPE. RALPH BOWEN, South. M. J. **25**:481 (May) 1932.

The case reported occurred in a boy 5 years of age. He showed a lack of sweat glands and pilosebaceous apparatus over most of the body, marked dental aplasia, depressed nasal bridge, atrophic rhinitis, a smooth dry skin, papular lesions on the face and an intolerance to heat. No satisfactory basal metabolism rates could be obtained. The mentality was normal. The cases reported in the literature show no definite familial trend, but the author's case seems to indicate some definite heredity. There is no treatment for the condition.

SCHLUTZ, Chicago.

A NEW CONCEPTION OF THE AETIOLOGY OF ERYTHEMA NODOSUM. W. R. F. COLLIS, Quart. J. Med. **1**:141 (Jan.) 1932.

The author presents five cases of erythema nodosum intimately associated with tuberculosis. In three cases bacilli were found in the material obtained by gastric lavage by inoculations into guinea-pigs. He also presents three cases following streptococcic sore throats. These patients gave strongly positive skin reactions to hemolytic streptococcal endotoxin, but negative reactions to tuberculin. The author concludes that the allergens responsible for erythema nodosum in London are commonly tuberculin and hemolytic streptococcal endotoxin.

BRADFORD, Rochester, N. Y.

SOME OBSERVATIONS ON THE PATHOGENESIS OF ECZEMA OF INTERNAL ORIGIN AND OTHER ALLERGIC DISEASES. G. H. ORIEL, Proc. Roy. Soc. Med. **24**:1171 (July) 1931.

Over 200 cases of eczema of internal origin and of other allergic diseases were investigated with particular reference to specific sensitization. It was found that a fair percentage of patients were sensitive (by the intradermal method) to their own urinary proteose. The proteose (not a true proteose but so-called for the sake of brevity) is isolated from the urine by acidulating the urine, shaking it with a quarter of its volume of ether and treating the ether suspension with an excess of alcohol after it has separated. The resulting precipitate is centrifugated off, suspended in distilled water and again centrifugated. The residue is soluble in dilute alkalis. When isolated and injected intradermally into a sensitized person, a reaction results similar to that seen after injection of an antigen to which an allergic patient is sensitized. Desensitization was attempted by the injection of minute quantities of the proteose, with good results in some cases.

GUY, Pittsburgh. [ARCH. DERMAT. & SYPH.]

PHYSICAL ALLERGY: A LOCALIZED AND GENERALIZED ALLERGIC TYPE OF REACTION TO COLD. GEORGE W. BRAY, Proc. Roy. Soc. Med. **25**:131 (Dec.) 1931.

The patient was a sturdy boy of 8½ pounds (3,800 Gm.). His complaint was that, five minutes after putting his hands in cold water, they became pink and swollen, and so extremely itchy that he had to cry. The constant scratching caused large wheals to appear within ten minutes; the hands became brawny, red and swollen to more than twice their size, and he could not flex his fingers because of the stiffness and pain.

The boy was the second in a family of seven. Two of his brothers and one sister suffered from asthma, as also did his father, his father's only sister, his father's mother and his mother's father.

In the physical examination the patient showed nothing abnormal except enlarged and diseased tonsils. The biochemical and hematologic observations before and after immersion in the water and before and after the subcutaneous injections of 1 mg. of histamine are given in the paper, also the method used for desensitization by histamine.

WILLIAMSON, New Orleans.

TUBERCULOUS TYPE OF ERYTHEMA NODOSUM. ROBERT HUTCHISON, Proc. Roy. Soc. Med. **25**:137 (Dec.) 1931.

A patient 2½ years old was admitted to the hospital for loss of weight. She showed tuberculous signs in the lungs and gave a three plus Mantoux reaction. She was seen a year previous to presentation with a typical attack of erythema nodosum.

WILLIAMSON, New Orleans.

STREPTOCOCCAL OR RHEUMATIC TYPE OF ERYTHEMA NODOSUM. ROBERT HUTCHISON, Proc. Roy. Soc. Med. **25**:138 (Dec.) 1931.

A child 9 years old was admitted to the hospital with a typical attack of erythema nodosum. There had been four attacks previous to presentation. In each attack the cutaneous condition had been preceded by a severe sore throat and polyarthritis. The roentgenogram of the lungs was negative, as was the Mantoux reaction.

WILLIAMSON, New Orleans.

DERMATITIS OF BUTTOCKS. M. LAVERGNE, Nourrisson **20**:32 (Jan.) 1932.

It is claimed that the diaper rash associated with ammoniacal urine is due to the action of colon bacilli. Cures are rapidly effected by giving urinary antiseptics, e. g., methenamine with benzoic acid.

MCCLELLAND, Cleveland.

HEMANGIOMAS IN INFANCY. ALBERT COMTOIS, Union méd. du Canada **61**:432 (Feb.) 1932.

Hemangiomas may be divided into three classes: flat, tuberous and subcutaneous. In flat angiomas of uniform surface, widely infiltrating the skin, all treatment appears superfluous. The use of roentgen rays or radium in dosage sufficient to produce vascular obstruction and consequently a discoloration of the skin is dangerous because of indelible alterations in the skin worse than the original trouble.

In superficial, flat hemangiomas, stellate, well circumscribed or extensive, actinotherapy or electrodesiccation is the indicated treatment. For very circumscribed acuminate angiomas, instantaneous electrocoagulation is employed without anesthetic, either local or general. In the flat, superficial, widespread forms, actinotherapy through the Kromayer lamp with a dose that will produce vesiculation, carried on for a variable length of time, will change the color from a red or violet to a less noticeable rose if it does not disappear altogether.

Roentgenotherapy is the ideal treatment of tuberous or subcutaneous angiomas, the treatments being repeated every three or four weeks for from six to eight months.

In angiomas of the lips, the inside of the cheeks and the tongue, electrocoagulation under general anesthetic gives the best, most rapid results.

DRAKE, Toronto, Canada.

PRINGLE'S NEVUS? A CONTRIBUTION TO THE STUDY OF SYMMETRICAL FACIAL NEVI. V. NICOLETTI, Gior. ital. di dermat. e sif. **72**:1278 (Oct.) 1931.

This is the second case reported by the author. The patient was a boy, aged 14 years, who had no history of nervous disease. There were about seventy small, prominent, papular lesions on the face, which were the color of normal skin or perhaps slightly darker, of firm consistency and about the size of a pinhead. Histologically, there were fibrosis, diminution of the elastic fibers, ectatic blood vessels and cellular collections composed of epithelioid cells and fibroblasts. Cellular nests of nevic cells were present in most sections, which were derived from the epidermis.

PARDO-CASTELLO, Havana, Cuba. [ARCH. DERMAT. & SYPH.]

XERODERMA PIGMENTOSUM. LUIGI AJELLO, Gior. ital. di dermat. e sif. **72**:1600 (Dec.) 1931.

This is a necropsy report of a case of xeroderma pigmentosum, with a large ulcerated carcinoma of the face. The histologic lesions of the skin are described in detail. The most important visceral lesions were degeneration and sclerosis of the ovaries and the thyroid gland, hyperplasia of the suprarenals, particularly of the medullar substance, and chronic nephritis.

PARDO-CASTELLO, Havana, Cuba. [ARCH. DERMAT. & SYPH.]

EPIDEMIC OF IMPETIGO CONTAGIOSA. U. OTTINO, Prat. pediat. **10**:121 (March) 1932.

In an epidemic of impetigo contagiosa, a number of the patients had fever, enlargement of the spleen, albuminuria or low grade involvement of the joints at about the time of the shedding of the crusts, lasting for days and even weeks before clearing up entirely. Ottino interprets these findings as evidences of septicemia, with the skin as the portal of entry. DOOLEY, Kent, Conn.

TINEA OF THE SCALP. ALBERTO OTEIZA Y SETIEN and JOSÉ DE CASTRO PALOMINO, Bol. Soc. cubana de pediat. **4**:3 (Jan.) 1932.

The authors advocate treatment of ringworm of the scalp with the x-rays. Applied in proper dosage and with proper technic, the rays will produce complete depilation in from twenty to forty-five days. The ringworm will disappear. Reestablishment of hair growth can be hastened by the use of the alpine lamp. It generally takes place within from seventy to ninety days, although the authors have seen reappearance delayed as long as five months. In children under 2 years weaker doses of the x-rays must be used. F. W. SCHLUTZ, Chicago.

MEIGE—MILROY DISEASE. EMIL PETRÁČEK, Česká dermat. **12**:285 (June) 1931.

After a review of the literature on chronic hereditary edema, the author cites a familial case. Mother, son and daughter were affected. The onset in all three was at puberty. The distribution was identical: The feet and the lower one third of the legs were involved, solid edema being sharply demarcated from the normal skin above. Biopsy showed normal epidermis and thickening of the corium. No morphologic or staining changes were found in the connective and elastic tissues. No mucin-like substance was found. There was a slight increase in nuclei. There was no infiltrate. Numerous dilated lymph vessels were found in the deeper layers of the corium. The latter finding explains the genesis of the "pachyderma of the lower extremities." As is usually the case in moderate functional lymphostasis, the tissues are able to use up the slight excess of lymph and show a moderate hypertrophy and no degenerative changes such as are seen in mechanical and inflammatory lymphostasis. The author's patients also showed hypothyroidism as the underlying cause of the functional lymphostasis. He considers Meige's disease a *forme fruste* of myxedema.

SPINKA, Texarkana, Texas. [ARCH. DERMAT. & SYPH.]

ERYTHEMA NODOSUM AND TUBERCULIN REACTION. D. MORITZ, Orvosi hetil. **75**:879, 1931.

Erythema nodosum has been considered for a long time as a product of reaction to tuberculin. Many of the previous authors interpreted it as an autogenous reaction to tuberculin. Moritz reasoned that if this connection is present, injection of tuberculin should cause a reappearance of erythema nodosum. Intradermal injections of tuberculin were given to ten children who had had erythema nodosum. In four cases, two or three days after the injection, four or five nodules developed on the anterior surface of the lower leg. The appearance was exactly that of erythema nodosum. The nodules disappeared in a few days.

ZENTAY, St. Louis.

Surgery and Orthopedics

CONGENITAL DISLOCATION OF THE HIP: EARLY DIAGNOSIS. JUSTIN A. GARVIN, Arch. Pediat. **49**:255 (April) 1932.

The author reports a case of unilateral congenital dislocation of the hip diagnosed at the age of 6 months. He emphasizes the necessity of keeping the possibility of such deformity in mind during the routine examination of infants if early diagnosis is to be secured. Important points in the diagnosis were as follows: 1. The nucleus of the epiphysis of the head of the left femur is much smaller than that of the right femoral head. 2. The distance between the upper end of the left femoral shaft and the pelvic bone nearest to it and its distance from the acetabulum are greater than on the right side. 3. The prolongation upward of the axis of the neck of the left femur passes above the acetabulum. 4. The roof of the left acetabulum is sloping and diverges from the proximal end of the shaft of the femur instead of being roughly parallel to it.

Treatment consisted in application of a plaster cast to secure abduction of the left femur. New casts were applied to conform with the growth of the baby.

WADDELL, JR., University, Va.

FRACTURE OF THE SKULL IN CHILDREN. JAY IRELAND, Arch. Surg. **24**:23 (Jan.) 1932.

Eighty cases of fracture of the skull in patients under 12 years of age were studied. Falls were the most frequent causative agent, and automobile accidents were the second largest etiologic factor. The parietal bone was most frequently fractured, and the frontal bone was next in frequency. Basal fractures in children are not as common as in adults. The symptoms generally associated with this type of injury are described. Lumbar puncture was performed only fourteen times on thirteen patients. Lumbar puncture is not advised if a diagnosis can be made by physical examination, roentgen examination and other means. It is pointed out that in cases of fracture of the skull the prognosis is much better in children than in adults. Only two of the eighty patients died. The prognosis is bad when the pupils are fixed and dilated and when all the reflexes are absent. The author recommends conservative treatment. Hypertonic salt solution may be given intravenously. Therapeutic lumbar puncture should not be done as a routine in cases of fracture of the skull unless there are signs of increasing pressure. When tapping the spinal fluid did not relieve the symptoms of pressure in this series, surgical decompression was done. This was necessary in only seven patients. In view of the low mortality with conservative treatment the author recommends such treatment rather than intervention unless the latter is particularly indicated.

KAISER, Rochester, N. Y.

THE BACTERIOLOGY OF ABSCESS OF THE LUNG AND METHODS FOR ITS STUDY. JOHN COHEN, Arch. Surg. **24**:171 (Feb.) 1932.

In order to settle the disagreement in the literature as to the presence or absence of anaerobes in the fetid pus of suppurations from the lung, cultural studies were made of the entire bacterial flora in abscesses of the lung. The pus was obtained at operation in cases of pulmonary abscess. It was found that the flora is rich and varied and seems to occur in combinations of organisms. In the sixteen cases of abscess of the lung studied in which pus was obtained at operation, Streptococcus, the diphtheroid and B. melaninogenicum were found in fourteen cases. There was close symbiosis of the two organisms most commonly found in abscess of the lung, Streptococcus gamma and B. melaninogenicum. The author raises the question as to whether this combination of organisms has a bearing on the etiology of abscesses of the lung

KAISER, Rochester, N. Y.

THE TREATMENT OF INTUSSUSCEPTION. H. J. SHELLEY, Arch. Surg. **24**:318 (Feb.) 1932.

The usual factors in the diagnosis and treatment of intussusception are discussed. One helpful suggestion in diagnosis is given. If intussusception is suspected but not felt, either because of abdominal distention or because of the child's crying, the following procedure will often result in a positive diagnosis: The examiner's right index finger is placed in the child's rectum and his left hand on the abdomen. The assistant then holds the child in a sitting posture with its face toward the examiner. The tumor will usually drop down between the examiner's hands.

KAISER, Rochester, N. Y.

THE TREATMENT OF EMPYEMA IN SMALL CHILDREN. W. ROGER MOORE, South. M. J. **25**:574 (June) 1932.

The author reports nine cases of empyema in patients treated with repeated aspirations. Of the nine patients whose cases were reported six recovered fully without any further surgical procedure; two showed marked improvement through a series of aspirations but later required major surgical procedures.

With the progress of aspiration the general condition of all these patients improved. Several patients that were poor operative risks at the onset of treatment later were good operative risks.

Some of these cases demonstrate that massive pleural exudates may clear up entirely under repeated aspirations. This method of treatment will result in a cure with some patients; those patients whose condition fails to clear up under aspiration alone are in an improved condition for thoracotomy.

SCHLUTZ, Chicago.

INFANTS' SURGERY AND ORTHOPEDICS FOR 1932. A. MOUCHET and C. ROEDERER, Paris méd. **1**:525 (June 18) 1932.

The authors give their annual review of the subjects of orthopedics and surgery for infants for 1932. The subjects reviewed are osseous hypertrophy and dystrophies, the effect of the parathyroids on the osseous system, osteomyelitis (particularly resection), actinomycosis and typhoid arthritis. Under the heading of individual bones are considered fractures of the skull, vertebral injuries, mobilization, luxation of the vertebral column and scapula, Volkmann's syndrome, tendon repair in the hand, arthritis deformans, coxa vara, osteochondritis and talipes varus. In the section on the abdomen are discussed pneumococcus peritonitis, rupture of the intestines, invagination, cysts and psoas abscess. Ovarian cysts, testicular torsion, hypospadia, and orchidopexy are discussed under genital organs. The recent literature contains work on tumors of the bone by Sabrazes and his associates of Bordeaux, on osseous tuberculosis by Sorrel and Sorrel-Dejerine of the Trosseau hospital and on the palatine division by Victor Veau.

SANFORD, Chicago.

SYMMETRICAL CONGENITAL CONTRACTURE OF ALL JOINTS: ARTHROGRYPOSIS MULTIPLEX CONGENITA. J. ČIPEK, Časop. lék. česk. **69**:856 (June 6) 1930.

Symmetrical congenital contracture of all joints is rare. Several cases reported involve either the upper or lower extremities, but not both. The characteristic finding is an adduction contracture of the upper extremity. Active or passive abduction, elevation or rotation is impossible. The configuration of the joint changes so that the shoulder appears more pointed and seems to project forward. The elbows are usually an extension deformity. The hand may be in any one of the flexion deformities, and the fingers may be entirely extended. The hip may be a flexion and abduction or an extension deformity. The knee is either a flexion or an extension deformity. The foot is usually an equinovarus deformity. The patella is aplastic or missing in some cases. The author pre-

sents two cases in which there is a deformity of all twelve joints, making, with the reported cases to date, a total of only seven cases of symmetrical congenital contracture of all joints. The cases in which a smaller number of joints is affected are much more numerous.

STULIK, Chicago.

TRAINING OF THE ARMLESS. A. BARTOŠ, Časop. lék. česk. **69**:860 (June 6) 1930.

The author evaluates the work of the institute and concludes that the training should develop the patient so that all reasonable independence in the matter of daily personal care is obtained as rapidly as possible. Photographs of the various methods used in working in the garden and shops and in writing and reading are shown.

STULIK, Chicago.

ASPIRATION OF PARTICLES OF BRAIN INTO THE RESPIRATORY TRACT IN INJURY TO THE SKULL. D. HIDASSY, Orvosi hetil. **1**:92, 1931.

A boy, 9 years old, received a fatal fracture of the base of the skull from being run over by the wheel of a truck. At autopsy there was found a considerable amount of brain tissue in the larynx and bronchi in addition to fluid blood.

[ARCH. PATH.]

TREATMENT OF RACHITIC PES PLANUS IN CHILDREN. W. MOL, Maandschr. v. kindergeneesk. **1**:389 (May) 1932.

The author gives a survey of the cause and the treatment of pes valgus and pes planovalgus.

VAN CREVELD, Amsterdam.

Miscellaneous

NITROBENZENE POISONING: REPORT OF AN UNUSUAL CASE IN A CHILD. SIDNEY D. LEADER, Arch. Pediat. **49**:245 (April) 1932.

A case of nitrobenzene poisoning in a 20 month old infant is reported. Owing to a druggist's error, nitrobenzene was administered by mistake instead of oil of bitter almonds. Outstanding symptoms and signs were as follows: The lips, cheeks, hands and other vascular regions of the body were mulberry blue, while the rest of the body was a livid slate blue. The child was semicomatose and only slightly dyspneic, and the breath had a peculiar sweetish odor. A specimen of blood was chocolate brown, remaining so even after shaking. Spectroscopic examination of the blood revealed a definite band of methemoglobin.

Treatment consisted of immediate stimulation, gastric lavage, exsanguination, transfusion of 200 cc. of maternal blood and administration of oxygen.

Oil of mirbane is the trade name for nitrobenzene, also called artificial oil of bitter almonds. It is used in the manufacture of aniline and aniline dyes, cheap perfumes, hair dyes, cosmetics, explosives and insecticides and as a cheap substitute for oil of bitter almonds as a flavoring extract. The poison may be inhaled, absorbed or ingested. The author refers in detail to other reported cases of poisoning by this substance, and feels that in any case of sudden cyanosis, especially when the color seems different from that seen ordinarily, nitrobenzene poisoning must be suspected.

WADDELL, JR., University, Va.

COCAINE INTOXICATION IN AN INFANT EIGHTEEN MONTHS OF AGE. JOSEPH H. MARCUS, Arch. Pediat. **49**:261 (April) 1932.

A case of cocaine intoxication occurring in an 18 month old baby is reported. Poisoning followed the use of a nasal spray containing a 5 per cent solution of cocaine hydrochloride.

WADDELL, JR., University, Va.

CARE OF THE SOFT TISSUES SURROUNDING THE TEETH OF CHILDREN. BENJAMIN KLITZKY, J. Am. Dent. A. **19**:793 (May) 1932.

After birth and until the eruption of the deciduous teeth, the author suggests that the infant's gums, tongue and mucous membrane lining of the mouth should be gently rubbed daily with a swab in the form of cotton wrapped about the finger and dipped into a weak, sweetened solution of boric acid. With the eruption of the deciduous teeth a small brush should be used daily in massage over both the tooth structure and the soft tissues, and this should be continued after the eruption of the permanent teeth.

The author urges that the same care be applied in restoration of lost dental structure in the child as in the adult, as faulty restorative operations serve as an irritant to the soft tissues. Tartar and irregular teeth are also responsible for gingival irritation.

Marked swelling and hemorrhage of the gums due to dietary insufficiencies are common, and easily disappear with the use of proper diet and some prophylactic measures.

Stomatic or aphthous ulcers are commonly found as a result of digestive disturbances, and quickly disappear when touched with an astringent or caustic, a cathartic being used also.

Vincent's infection in the mouth in children is commonly seen in unclean mouths, and it is sometimes secondary to general debility. It quickly disappears with proper dental attention.

MARKUS, Philadelphia.

NEED OF COOPERATION BETWEEN PEDIATRICIAN AND DENTIST. EDWARD CLAY MITCHELL, J. Am. Dent. A. **19**:874 (May) 1932.

In this article the author stresses the point that, as teeth are a living part of the organism, factors affecting the health of the person will also influence the well-being of the teeth. One of the chief factors is nutrition.

Proper nutrition of the expectant mother, as well as of the child, should be in the form of a well balanced diet consisting of proper proportions of proteins, fats, carbohydrates, inorganic salts, minerals, water, vitamins and sunlight. This is essential for the formation and maintenance of sound bone and teeth. The author cites several experiments to prove this point.

Milk is considered by the author as one of the most useful of foods, and he suggests its use to the extent of a quart a day as a means of safety. The bad dietary habits of modern civilization the author claims are responsible for widespread dental disease.

The use of vitamin A in the form of cod liver oil in conjunction with vitamin D in the form of viosterol essential for good bone and tooth structure, along with the use of vitamin C for the insurance of healthy gums.

MARKUS, Philadelphia.

WHAT DO WE KNOW ABOUT DENTAL CARIES? (A CRITICAL REVIEW OF RECENT INVESTIGATION.) ROBERT G. KESEL, J. Am. Dent. A. **19**:903 (June) 1932.

The following are some of the conclusions at which the author arrives after a critical review of recent investigations on dental caries.

Little dental caries has been found in primitive people while they live in their native environment. Caries has increased with modern civilization, and is more marked in childhood and adolescence, i. e., during the period of growth. Pregnancy and diabetes seem to increase susceptibility to caries. Caries is most frequently found in definite areas of the tooth, places where there is greater opportunity of stagnation and collection of foreign material. Certain types of bacteria are found in carious cavities, although susceptible areas of other teeth in the same person are not affected.

MARKUS, Philadelphia.

ORTHODONTIA. H. FROSSARD, Nourrisson **20**:175 (May) 1932.

This paper is a plea for greater conservatism in the straightening of teeth in children. The author advises waiting until the eruption of the twelfth-year molars. These teeth are better calcified and provide a firmer anchorage for the braces. Moreover, children of 12 or 13 years are much better able to endure the discomforts and annoyances of the procedure than are younger children.

McCLELLAND, Cleveland.

THE CONVALESCENT HOME FOR CHILDREN. R. MIEMAYER, Monatschr. f. Kinderh. **53**:174, 1932.

The writer reports the good results obtained in convalescent homes for children as a refutation to those authors who assert that results in these institutions are questionable. Studies were made of a group of children for weight, height, hemoglobin, differential white cell count and sedimentation of red cells.

Over half the children admitted were undernourished, 22 per cent markedly, and 30 per cent moderately. Anemia was present in three-quarters, being marked in about 37 per cent of the children in the winter and 21 per cent in the summer. As a rule, the differential count showed some eosinophilia. Abnormal reactions were also found in the sedimentation of red cells.

After the children had been at one of these convalescent homes out in the country, the writer found all these objective symptoms greatly improved, while the children themselves exhibited decided subjective improvement. Questionnaires later sent to the homes showed that this improvement was permanent.

GERSTLEY, Chicago.

CALCIUM THERAPY IN INFANCY AND CHILDHOOD. ANNE REHMANN, Monatschr. f. Kinderh. **53**:245, 1932.

This article reads suspiciously like an advertisement for calcium-gluconate (Sandoz). The writer recommends this preparation for premature infants, for all sorts of neuropathic disturbances depending on constitutional anomalies, for spasmophilia and for capillary bronchitis and pneumonia. For the latter, intramuscular injections are given on three consecutive days in doses of from 2 to 5 cc. Following this, from 2 to 4 tablespoonfuls of the powder are given daily. This treatment, combined with racemic ephedrine, seems to be the long sought-for specific in pneumonia.

GERSTLEY, Chicago.

EXPERT TESTIMONY IN PATERNITY SUITS IN CONSIDERATION OF THE OFFSPRING OF MINOR SIZE. BERNHARD VON SCHWEITZER, Ztschr. f. Geburtsh. u. Gynäk. **100**:251, 1931.

The author first discusses the difficulty that arises from the difference between the German law concerning paternity and medical experience. Another difficulty for the expert is brought about by the fact that there are various opinions as to the duration of pregnancy. Schweitzer himself believes that a mature child can be born between the two hundred and thirtieth and three hundred and second day following menstruation. He reports a case which proves that the length and weight of the child are not always a trustworthy sign of the duration of pregnancy. A male child that showed a length of 43 cm. and a weight of 1,380 Gm. was born two hundred and sixty-six days after coitus. He was perfectly viable, and his later development was absolutely normal. The insufficient intra-uterine development was caused by a myomatous uterus bicornis.

ADAIR and SIEDENTOPF, Chicago.

Society Transactions

CHICAGO PEDIATRIC SOCIETY

Regular Meeting, Dec. 20, 1932

ARCHIBALD HOYNE, M.D., *President, in the Chair*

PRACTICAL APPLICATION OF SOME LESIONS IN THE SELF-SELECTION OF DIET STUDY TO THE FEEDING OF CHILDREN IN HOSPITALS. DR. CLARA M. DAVIS.

This article will appear in full in a later issue.

BACILLARY DYSENTERY IN CHILDREN: A REPORT OF THE CASES IN THE COOK COUNTY CHILDREN'S HOSPITAL, CHICAGO, FOR 1932. DR. MAURICE L. BLATT and DR. NOEL G. SHAW.

Dysentery in the children admitted to the Cook County Children's Hospital has persisted during the summer and autumn for the past three years. One hundred and four cases occurred from April through November, 1932, with the greatest incidence in August. Ninety-three patients were over 1 year of age.

The onset is sudden, with nausea, vomiting, headache, abdominal pain and liquid stools with mucus and blood. The patient is listless and acutely ill. The initial temperature of from 100 F. to 102 F. becomes normal in from one to four days. The white blood count of the patients varied from 3,500 to 15,000 at the time of admission. The average stay in the hospital of those who lived was nine and one-half days. Seven of the 13 children who died were moribund on entrance to the hospital.

The patients were assigned in rotation to three groups, the first with a high protein, the second with a high carbohydrate, and the third with an intermediate, type of diet. The type of diet seemed to make no appreciable difference in the rate of recovery. Hypodermoclyses of 5 per cent dextrose, Hartmann's solution or physiologic solution of sodium chloride seemed the most important part of the treatment in the initial toxic stage. Mucus from the stools was plated on 1 per cent lactose-litmus plates. Dysentery bacilli were isolated from 50 of the 86 patients studied up to this time. While a diversity of organisms have been recovered, 35 of them are a subtype of the Flexner (Hiss) bacillus. Sonne organisms were not found.

Blood of 25 of these convalescent patients was tested for stock antigens of dysentery organisms. The serums of a majority of the patients agglutinated a stock Hiss organism through 1:2,560 (macroscopic) and, to a lesser degree, their own organism isolated from the stools. Cross-agglutination with a stock strain of Strong occurred, usually to a lesser degree than with that of Hiss (1:1,280 or 1:640).

DYSENTERY: PATHOLOGIC FINDINGS. DR. RICHARD JAFFÉ.

At postmortem examination, one is impressed by the emptiness and contraction of the large bowel, and by the marked hyperplasia of the mesenteric and mesocolic lymph glands, which are deeply injected and are of sizes ranging from that of a pea to that of a cherry.

Macroscopically, the lesions are chiefly in the colon and the lower one third of the ileum. The mucosa is edematous, diffusely injected and slightly hemorrhagic. In some instances multiple small superficial ulcerations are also found.

The mucosa is covered with a fibrinopurulent exudate, which may in some regions assume the appearance of a necrotic membrane. The solitary lymph follicles are prominent. The pinpoint-sized ulcers enlarge with the progress of the illness, involving the swollen follicles as well as the intervening mucosa. Microscopically, the histologic changes in the ileum are usually catarrhal, and suppuration and ulceration are relatively rare. The villi are edematous and of increased cellularity, with a predominance of small and large round cells. The follicles are large, with germinal centers formed by swollen and proliferated histiocytes.

In the colon there is an edematous loosening of the tunica propria and a desquamation of the surface epithelium. The surface deprived of its epithelium is covered by a thick layer of degenerated cells, many polymorphonuclear leukocytes and fibrin. The glands, lined with goblet cells, are filled with mucus and pus cells. The tunica propria is infiltrated with leukocytes and free histiocytes. The latter can be traced to the swollen and proliferated reticular cells, which often contain dark brown pigment. The follicles are large, with swollen reticular cells and pus cells. The submucosa is often thickened and infiltrated with plasma cells and large histiocytes. With the onset of ulcerative changes, the superficial layer of the infiltrated and loosened mucosa sloughs off, while the deeper portions of the mucosa become transformed into a cellular granulation tissue with many polymorphonuclear leukocytes.

The brain, on gross examination, is slightly swollen and edematous. The leptomeninges are thin and moderately injected. The histologic observations will be discussed by Dr. Hassin. Suffice it to say, they are not those of an inflammation or of encephalitis, but those of a degenerative process best described by the term "encephalopathy."

The liver and kidneys are swollen. The liver cells contain an increased amount of fat. The spleen shows a congestion of the pulp, with hyperplasia of the reticular cells. The malpighian bodies are prominent.

In general, the course of dysentery in children is much shorter than in adults, who have a greater resistance and live for a longer period. Anatomically, therefore, the acute, slight changes predominate. In adults, as seen during the World War, extensive ulceration of the bowel occurs, while the intact organs show a brown atrophy. In these cases (adult) we also found a peculiar type of nephrosis which I have never seen duplicated elsewhere.

DYSENTERY: PATHOLOGY OF THE CENTRAL NERVOUS SYSTEM. DR. GEORGE B. HASSIN.

Nervous manifestations may so dominate the clinical picture of dysentery that it is but proper to speak of the "pathology" of the nervous system in this disease. However, very little is known of the central nerve changes in dysentery, common as this disease is. Aside from the fundamental contribution by Lotmar, which was published nineteen years ago, and which deals only with the experimental phase of the problem, and a few short notes scattered in a number of clinico-pathologic reports, nothing has been written on this subject. This is probably due to the fact that the cases of dysentery are handled not by neurologists or neuropathologists, but by general clinicians and pathologists. Thanks to the courtesy of Dr. Richard Jaffé, and the cooperation of Dr. Blatt, of the pediatric service of the Cook County Hospital, I was able to study a few cases of this disease. To these should be added several cases of severe gastro-intestinal infection sent me some years ago by Dr. Beverly, and a study of the experimental observations of Lotmar already mentioned.

The central nerve changes that occur in dysentery can be understood best when they are contrasted with those observed in other conditions in which the disease process is chronic and affects the nerve elements only—in short, in degenerative conditions (amaurotic family idiocy, for instance). In the latter, the changes in the ganglion cells and nerve fibers are accompanied by so-called marked progressive phenomena in the glia. This exhibits an immense increase in the amount of the cytoplasm, the processes of which ultimately replace the destroyed parenchyma.

In dysentery, as in any other toxic condition, the glia does not show such progressive changes, for, like the nerve tissue, it succumbs to the toxin, especially in severe cases. The ganglion cells exhibit under normal conditions a distinct chromophil, stainable-substance which in dysentery is broken up or dissolved, the ganglion cells appearing pale and swollen. Another change which is more severe is the formation of vacuoles; that is, the cell body becomes vacuolated and is often represented by an empty bag harboring a densely stained nucleus. Such an irreparable condition of the ganglion cells is termed liquefaction. An interesting phenomenon is the invasion of the ganglion cells and the axons by phagocytic glial elements (neuronophages and axophages) which eat up the damaged nerve tissue.

In severe cases the regressive changes in the glia are no less striking. The glia cell becomes homogeneous; the processes appear thick and plump, giving the cell body the appearance of an ameboid cell, and for this reason Alzheimer called such a changed glia cell ameboid. It is often packed with granules which are considered broken-down nerve tissue. In other instances the cell body and the processes are broken up into innumerable quadrangular granules called filling bodies by Alzheimer and clasmatodendrosis by Cajal. Another type of glia cell, which is frequent and is known as glia nuclei or oligodendroglia, also exhibits manifest changes. The cells increase in size and show a vacuolated cytoplasm which is considered by some investigators to be preameboid glia or swollen oligodendroglia.

There are other changes present in the brains of patients suffering from dysentery, but I cannot demonstrate them. In general, they are similar to those that occur in any toxic condition, and may be classified as regressive. Lotmar could demonstrate that in experimental animals the changes vary greatly, depending on the severity of the intoxication, the age of the animal, its general condition and many other factors. Some changes are reparable, others are not, and such a variation undoubtedly also occurs in man. Whatever their severity, it is possible to demonstrate the presence of some changes in the brain in practically every case of dysentery. However, one cannot say that they are typical, that is, that they necessarily denote dysentery.

DISCUSSION

DR. JESSE R. GERSTLEY: May I call attention to a possible misconception that may have resulted from Dr. Shaw's discussion of the etiology of summer diarrhea in the Middle West? Fifteen years ago, whenever the subject was mentioned it excited great furore. Many observers believed the etiology to be due to a specific injection. Kendall and Day, in an extensive study at the Boston Floating Hospital, reported a high percentage of diarrhea cases as due to dysentery. In the Middle West we attributed the diarrhea to factors of heat, poor hygiene and improper nutrition. In 1915, Kendall and Day came to Chicago. We made a combined study of the cases of diarrhea at the Sarah Morris Hospital. This work was of particular significance because the bacteriology was done by the same men who had previously reported from the Boston Floating Hospital. In our material practically no dysentery organisms were found.

In our report we emphasized the difference of etiology in different geographic locations, and offered the explanation that in the East raw milk was used, while in the Middle West it was boiled. There is no question but that dysentery was an important factor in the mortality associated with summer diarrhea in the Middle West.

As regards the present excellent study, it would be interesting to know the source of the milk supply; whether the patients came from out of town, and whether the milk came from dairies that were supervised.

DR. NOEL B. SHAW: This work was supervised by Dr. Blatt, chief of the staff of the children's department of the Cook County Hospital, and I will appreciate it if he will answer these inquiries.

DR. MAURICE L. BLATT: Dr. Shaw has attempted to draw a picture of the clinical and pathologic features of dysentery in children as it occurred in Cook

County Hospital during 1930, 1931 and 1932. Through the cooperation of the pediatric staff, all cases of dysentery were transferred to my service.

This paper deals with a disease quite similar to that to which Dr. Gerstley referred; on careful investigation, a dysentery organism was recovered from many of the patients afflicted. It is obviously impossible for us to go back to a piece of work done some years ago and check that work, nor is it our desire to do so. We wish to demonstrate to clinicians and pediatricians that an organism, B. dysenteriae, is common in the group of children coming to the Cook County Hospital with symptoms of dysentery. These are, for the most part, children from the city, frequently family groups or regional groups. If Dr. Shaw has demonstrated this, I think the paper is worth while.

The bacteriologic content of the intestinal tract shows some peculiarities which, I think, are not commonly known. For instance, there is a seasonal variance in the bacterial flora that has been recognized for some years. There is a gram shifting in the flora during the summer months, and the curve is associated with heat and humidity. This has been demonstrated in rats and in human beings. The curve has been shown by the agricultural department to be coincident with the curve of the fluctuation type of cattle food. It is of interest to notice in Dr. Shaw's chart the increase in dysentery with the rise in temperature and increase in humidity. It was not Dr. Shaw's intention to show a causal relationship in this study; nevertheless it should not be forgotten that Dr. Finkelstein once stated that by placing a child in the heat and humidity of a basement during the summer, severe diarrhea could be produced.

Book Reviews

Management of the Sick Infant. By Langley Porter and William E. Carter. Fourth edition. Price, $8. Pp. 763, with 80 illustrations. St. Louis: C. V. Mosby Company, 1932.

This is the fourth revised edition of the excellent work on therapeutics for children. The book is well executed and printed and takes up in detail the treatment of the various conditions with which one has to deal. The illustrations are not numerous, but are good, and portray especially well the various methods employed, including subcutaneous and intravenous medication. The entire book is well suited to help the physician in the treatment and care of infants and children.

The next to the last chapter is on drugs, and the prescriptions are arranged under the conditions to be treated. This should prove of value to the general practitioner. A short chapter on poisons and their antidotes follows.

A Standard Classified Nomenclature of Disease. Compiled by the National Conference on Nomenclature of Disease. Price, $3.50 (25 per cent discount on lots of ten or more). Pp. 700. New York: Commonwealth Fund, 1932.

This much needed book is the result of the efforts of committees from all outstanding special societies in medicine and likewise of several hospitals, to attempt to classify disease in a standard way, so that it would be possible for one interested to look up any subject that he might desire to investigate with little loss of time. It is also to be hoped that this or some similar arrangement will be used in hospitals for the classification of disease. The book is the result of years of labor and careful attention, and has been carefully scanned by various medical men and organizations. It is therefore worthy of careful consideration and, we trust, of extensive use.

The Differential Diagnosis of Endocrine Disorders. By Allan W. Rowe. Price, $4. Pp. 219, with 50 tables. Baltimore: Williams & Wilkins Company, 1932.

This monograph is the result of twenty years of study on five thousand subjects. The subjects are grouped as to their complaints, medical history, physical examination, laboratory findings and special examinations. The result is therefore an actual experience as to the response of patients with endocrine disturbances to the foregoing factors. The results are interesting and show that in actual experience the so-called classic symptoms of the endocrinopathies are not so frequently apparent as one is led to believe. This book should be of value to any physician who wishes to know the actual findings in endocrine disturbances. It is interestingly written and is well printed.

Child Care Today. By Béla Schick and William Rosenson. Price, $2.50. Pp. 320. New York: Greenberg, Publisher, Inc., 1932.

This book contains chapters on prenatal care, infancy, the preschool child, diseases of childhood and contagious diseases. These subjects are covered in a complete and interesting manner. It is one of the best books for lay reading on infancy that the reviewer has read in recent years, and is what one would expect from an author of such prominence in the pediatric world. This book can be unhesitatingly recommended to the young mother who wishes a ready reference for the period of infancy and that of the preschool child.

Elements of Electrocardiographic Interpretation. By Louis N. Katz and Victor Johnson. Price, $1. Pp. 38, with 38 illustrations. Chicago: University of Chicago Press, 1932.

This illustrated booklet is presented chiefly for the beginner in cardiac physiology and the physician whose specialty is outside this field. It consists of a table of characteristics of the normal electrocardiographic cycle and thirty-eight descriptive illustrations of electrocardiographic deviations from the normal. A case history of each has purposely been omitted. The appendix contains a procedure for reading an electrocardiogram.

News and Comment

GENERAL

Postgraduate Courses in Pediatrics.—The Medical Faculty of the University of Vienna is offering its usual postgraduate courses. Those in pediatrics cover fifteen subjects, all by well known teachers.

UNIVERSITY NEWS

Martin J. English, formerly associate professor of pediatrics, has been appointed full professor and head of the department of pediatrics at the Boston University School of Medicine, to succeed the late Orville R. Chadwell.

Herman C. Petterson has been appointed associate professor of pediatrics at the Boston University School of Medicine.

CORRECTION

In the article by Dr. N. I. Krasnogorski, entitled, "Conditioned Reflexes in Psychopathology of Childhood," which appeared in the February issue (**45**:355, 1933), Birmingham, Alabama, was given as the author's residence instead of Leningrad, U. S. S. R.

Directory of Pediatric Societies

INTERNATIONAL

International Association of Preventive Pediatrics

President: Professor Taillens, Lausanne, Switzerland.
Secretary: Dr. P. Oltramare, rue Decandolle, Geneva, Switzerland.

International Pediatric Congress

President: Dr. George Frederic Still, 28 Queen Anne St., London, W. 1.
Secretary: Dr. Leonard K. Findlay, 61 Harley St., London, W. 1.
Place: London. Time: July 20-23, 1933.

FOREIGN

Royal Society of Medicine, Section for the Study of Disease in Children

President: Dr. Leonard G. Parsons, 58, Calthorpe Road, Birmingham, England.
Secretary: Dr. W. G. Wyllie, 33, Wimpole St., W. 1, London.
Place: London. Time: May 26, 1933.

NATIONAL

American Medical Association, Scientific Assembly, Section on Diseases of Children

Chairman: Dr. Frederic W. Schlutz, Bobs Roberts Hospital, University of Chicago, Chicago.
Secretary: Dr. Alfred A. Walker, Highland Plaza Apartments, Birmingham, Ala.
Place: Milwaukee. Time: June 12-16, 1933.

American Academy of Pediatrics

President: Dr. Samuel McC. Hamill, 1822 Spruce St., Philadelphia.
Secretary: Dr. C. G. Grulee, 636 Church St., Evanston, Ill.

American Child Health Association

President: Dr. Samuel McC. Hamill, 1822 Spruce St., Philadelphia.
Secretary: Dr. Philip Van Ingen, 125 E. 71st St., New York.

American Hospital Association, Section on Children's Hospitals

President: Dr. Thomas B. Cooley, 7815 E. Jefferson Ave., Detroit.
Secretary: Miss Bena M. Henderson, 721 N. 17th St., Milwaukee.

American Pediatric Society

President: Dr. Oscar M. Schloss, 1185 Park Ave., New York.
Secretary-Treasurer: Dr. Hugh McCulloch, 325 N. Euclid, St. Louis.
Place: Washington, D. C. Time: May 8-10, 1933.

Canadian Society for the Study of Diseases of Children

President: Dr. Frederick F. Tisdall, 170 St. George St., Toronto, Ontario.
Secretary-Treasurer: Dr. T. G. H. Drake, 67 College St., Toronto, Ontario.

Society of Pediatric Research

President: Dr. Bengt Hamilton, University of Chicago, Chicago.
Secretary-Treasurer: Dr. Charles F. McKhann, Harvard Medical School, Boston.
Place: New York. Time: May 6, 1933.

SECTIONAL

Central States Pediatric Society

President: Dr. Julius H. Hess, 104 S. Michigan Ave., Chicago.
Secretary: Dr. A. H. Parmelee, 715 Lake St., Oak Park, Ill.
Place: Chicago. Time: Sept. 22-23, 1933.

North Pacific Pediatric Society

President: Dr. Herbert E. Coe, 509 Olive St., Seattle.
Secretary: Dr. Raymond H. Somers, Cobb Bldg., Seattle.

Southern Medical Association, Section on Pediatrics

Chairman: Dr. Hugh L. Dwyer, 406, W. 34th St., Kansas City, Mo.
Secretary: Dr. Luther W. Holloway, 117 W. Duval St., Jacksonville, Fla.
Place: Richmond, Va. Time: November, 1933.

STATE

Alabama Pediatric Society

President: Dr. C. E. R. Parker, 401 S. Court St., Montgomery.
Secretary-Treasurer: Dr. John W. Simpson, 1117 S. 22d St., Birmingham.
Place: Montgomery. Time: April 18-21, 1933.

Georgia Pediatric Society

President: Dr. M. Hines Roberts, Atlanta.
Secretary-Treasurer: Dr. Roger W. Dickson, 33 Ponce de Leon Ave., N. E., Atlanta.

Louisiana State Pediatric Society

President: Dr. Cecil O. Lorio, 245, 3d St., Baton Rouge.
Secretary-Treasurer: Dr. Maud Loeber, 3503 Prytania St., New Orleans.

Medical Society of State of New York

Chairman: Dr. Brewster Doust, 605 Medical Arts Bldg., Syracuse.
Secretary: Dr. G. C. Sincerbeaux, 6 William St., Auburn.

Nebraska Pediatric Society

President: Dr. W. O. Colburn, 724 Sharp Bldg., Lincoln.
Secretary-Treasurer: Dr. C. G. Weigand, 1614 Medical Arts Bldg., Omaha.
Place: As announced by committee. Time: Second Thursday of each month from October to June, inclusive. Dinner at 6 p. m.

North Carolina Pediatric Society

President: Dr. Yates W. Faison, 121 W. 7th St., Charlotte.
Secretary: Dr. E. K. McLean, 121 W. 7th St., Charlotte.
Place: Various children's hospitals. Time: Twice a year.

Oklahoma State Pediatric Society

President: Dr. Clark H. Hall, 117 N. Broadway, Oklahoma City.
Secretary: Dr. M. J. Searle, 108 W. 6th St., Tulsa.

SOUTH CAROLINA PEDIATRIC SOCIETY

President: Dr. T. D. Dotterer, 1512 Marion, Columbia.
Secretary-Treasurer: Dr. Julian P. Price, 117 W. Cheves St., Florence.

TEXAS PEDIATRIC SOCIETY

President: Dr. Boyd Reading, 2201 Avenue D, Galveston.
Secretary-Treasurer: Dr. F. W. Hoehn, 1006 Medical Arts Bldg., Waco.

VIRGINIA PEDIATRIC SOCIETY

President: Dr. St. George Grinnan, 925 W. Grace St., Richmond.
Secretary-Treasurer: Dr. J. B. Stone, 2042 Park Ave., Richmond.

WEST VIRGINIA STATE MEDICAL SOCIETY, SECTION ON PEDIATRICS

President: Dr. George M. Lyon, 955, 4th Ave., Huntington.
Secretary: Dr. M. F. Petersen, 1013 Quarrier St., Charleston.

LOCAL

ACADEMY OF MEDICINE OF CLEVELAND, PEDIATRIC SECTION

Chairman: Dr. C. W. Burhans, 14805 Detroit Ave., Lakewood, Ohio.
Secretary: Dr. J. A. Garvin, 2009 Adelbert Road, Cleveland.
Place: 2009 Adelbert Road. Time: Four meetings, from September to May.

ACADEMY OF MEDICINE, TORONTO, SECTION OF PEDIATRICS

President: Dr. Gladys Boyd, 56 DeLisle St., Toronto.
Secretary: Dr. Lawrence Murray, 1870 Bloor St., W., Toronto.

BRONX PEDIATRIC SOCIETY

President: Dr. Edward L. Benjamin, 2021 Grand Concourse, New York.
Secretary: Dr. Harry M. Schapiro, 1882 Grand Concourse.
Place: Concourse Plaza, 161st St. and Grand Concourse. Time: Every Second Wednesday of each month, except June, July, August and September. Annual meeting, May 10, 1933.

BROOKLYN PEDIATRIC SOCIETY

President: Dr. Carl H. Laws, 12 Pierrepont St., Brooklyn.
Secretary: Dr. Lewis A. Koch, 62 Pierrepont St., Brooklyn.
Place: Kings County Medical Society Bldg. Time: Last Wednesday of each month, except June, July and August.

CENTRAL NEW YORK PEDIATRIC CLUB

President: Dr. Frank Vander Bogert, 111 Union St., Schenectady.
Secretary: Dr. Frank J. Williams, 58 S. Swan St., Albany.
Place: Various cities in New York. Time: Fourth Thursday of October, January and April.

CHICAGO PEDIATRIC SOCIETY

President: Dr. Archibald L. Hoyne, 25 E. Washington St., Chicago.
Secretary: Dr. Bert I. Beverly, 8 S. Michigan Ave., Chicago.
Place: City Club. Time: Third Tuesday of each month.

DALLAS COUNTY PEDIATRIC SOCIETY

President: Dr. P. E. Luecke, 4105 Live Oak St., Dallas, Texas.
Secretary: Dr. R. S. Usry, 1835 Garrett Ave., Dallas, Texas.
Place: Bradford Memorial Hospital. Time: 1 p. m., first and third Saturdays of each month.

Detroit Pediatric Society

President: Dr. Bernhard Bernbaum, 5057 Woodward Ave., Detroit.
Secretary: Dr. Sarah S. Schooten, 5057 Woodward Ave., Detroit.
Place: Children's Hospital of Michigan. Time: No fixed date; approximately once a month.

Fulton County Medical Society, Pediatric Section (Atlanta, Ga.)

Chairman: Dr. Roger W. Dickson, 33 Ponce de Leon Ave., N. E., Atlanta.
Secretary: Dr. T. I. Willingham, 384 Peachtree St., Atlanta.
Place: Academy of Medicine, 32 Howard St. Time: Second Thursday of each month from October to April, 8 p. m.

International Pediatric Society

President: Dr. Barnet E. Bonar, 9 Exchange Pl., Salt Lake City, Utah.
Secretary-Treasurer: Dr. Edwin R. Murphy, 9 Exchange Pl., Salt Lake City, Utah.
Place: Salt Lake City, General Hospital. Time: First Thursday of each month, 8 p. m.

Memphis Pediatric Society

President: Dr. R. B. McCormick, 1074 Madison Ave., Memphis, Tenn.
Secretary-Treasurer: Dr. W. D. Mims, 1024 Madison Ave., Memphis, Tenn.
Place: Memphis General Hospital. Time: Second Tuesday of each month.

Milwaukee Pediatric Society

President: Dr. Karl E. Kassowitz, 709 N. 11th St., Milwaukee.
Secretary: Dr. John H. Reynolds, 747 N. 27th St., Milwaukee.
Place: Children's Hospital. Time: Second Wednesday of each alternate month, beginning with February.

New England Pediatric Society

President: Dr. Thomas A. Foster, 131 State St., Portland, Maine.
Secretary: Dr. Gerald Hoeffel, 319 Longwood Ave., Boston.
Place: Boston Medical Library. Time: Four meetings a year, occurring from September to May.

New York Academy of Medicine, Section of Pediatrics

Chairman: Dr. John Caffey, 50 Haven Ave., New York.
Secretary: Dr. Harry Bakwin, 132 E. 71st St., New York.
Place: New York Academy of Medicine, 2 E. 103d St. Time: Second Thursday of each month from October to May, inclusive, 8:30 p. m.

Northern California Pediatric Society

President: Dr. Edward B. Shaw, 384 Post St., San Francisco.
Secretary-Treasurer: Dr. Lloyd Hardgrave, 384 Post St., San Francisco.
Place: Various teaching schools. Time: Monthly.

Northwestern Pediatric Society

President: Dr. Irving McQuarrie, Dept. Pediatrics, University of Minnesota, Minneapolis.
Secretary: Dr. Alexander Stewart, 459 Lowry Medical Arts Bldg., St. Paul.

Philadelphia Pediatric Society

President: Dr. Joseph Stokes, Jr., Children's Hospital, Philadelphia.
Secretary: Dr. James E. Bowman, 4091 Comly St., Philadelphia.
Place: College of Physicians, 19 S. 22d St. Time: Second Tuesday of each month from October to June, inclusive.

Pittsburgh Pediatric Society

President: Dr. Henry C. Flood, 119 S. Highland Ave., Pittsburgh.
Secretary: Dr. E. R. McCluskey, Highland Bldg., Pittsburgh.
Place: Pittsburgh Academy of Medicine. Time: Second Friday, alternate months from October to April, inclusive.

Richmond Pediatric Society

President: Dr. F. W. Lewis, 3103 W. Franklin St., Richmond, Va.
Secretary-Treasurer: Dr. A. S. Hurt, 2618 Grove Ave., Richmond, Va.
Place: Retreat for the Sick, 2621 Grove Ave. Time: First Thursday of each month (other than during the summer).

Rochester Pediatric Society

President: Dr. S. W. Clausen, Strong Memorial Hospital, Rochester, N. Y.
Secretary: Dr. F. W. Bush, 29 N. Goodman St., Rochester, N. Y.
Place: Arranged by program committee. Time: Second Friday of each month from October to May.

Rocky Mountain Pediatric Society

President: Dr. J. A. Schoonover, Republic Bldg., Denver.
Secretary: Dr. Arthur L. Esserman, Republic Bldg., Denver.
Place: Children's Hospital, Denver. Time: First Saturday of each month from September to May, inclusive, 7 p. m.

St. Louis Pediatric Society

President: Dr. Hugh McCulloch, 325 N. Euclid Ave., St. Louis.
Secretary-Treasurer: Dr. Katherine Bain, Beaumont Bldg., St. Louis.
Place: St. Louis Medical Society. Time: Third Friday of every month.

Seattle Pediatric Society

President: Dr. C. L. Smith, 1215, 4th Ave., Seattle.
Secretary: Dr. N. W. Murphy, 515 Cobb Bldg., Seattle.
Place: College Club. Time: Third Friday of each month, 7 p. m.

Southwestern Pediatric Society

President: Dr. Donald K. Woods, 2545 4th Ave., San Diego, Calif.
Secretary: Dr. Jeanette Harrison, 1136 W. 6th St., Los Angeles.
Place: University Club of Los Angeles. Time: First Wednesday in January, March, May, September and November.

University of Michigan Pediatric and Infectious Disease Society

President: Dr. Henry G. Poncher, 5325 Kenmore Ave., Chicago.
Secretary: Dr. John P. Parsons, 320 S. Division St., Ann Arbor, Mich.